

Final  
Environmental Impact Statement



408 Permission and 404 Permit to  
Three Rivers Levee Improvement Authority  
for the  
Feather River Levee Repair Project, California,  
Segment 2

Prepared for:  
U.S. Army Corps of Engineers  
Sacramento District

October 2008

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Prepared for:

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**FINAL  
ENVIRONMENTAL IMPACT STATEMENT  
408 PERMISSION AND 404 PERMIT TO  
THREE RIVERS LEVEE IMPROVEMENT AUTHORITY FOR THE  
FEATHER RIVER LEVEE REPAIR PROJECT, CALIFORNIA, SEGMENT 2**

| Lead Agency                                                                                                    | Project Location                                                                                                                                                |
|----------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Department of the Army<br>U.S. Army Corps of Engineers<br>Sacramento District                                  | Yuba County, California                                                                                                                                         |
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**ABSTRACT**

The Three Rivers Levee Improvement Authority (TRLIA) proposes constructing and maintaining a new setback levee along the Feather River approximately 5.7 miles in length and approximately 0.5 miles east of the existing left bank levee, except where it would join the existing levee at the north and south ends. The Applicant Preferred Alternative – Above Star Bend (ASB) Setback Levee Alternative (also referred to as the “Applicant Preferred Alternative”) includes removing all or portions of the existing levee. The intended outcome of the Applicant Preferred Alternative is to provide a setback levee in Segment 2 that meets the engineering and design standards of the Central Valley Flood Protection Board (CVFPB) and the U.S. Army Corps of Engineers (Corps) as well as the Federal Emergency Management Agency (FEMA) geotechnical requirements for through-seepage and underseepage at the water surface elevation for the 200-year flood event. The Applicant Preferred Alternative requires issuance of a permit by the Corps to TRLIA pursuant to Clean Water Act (CWA) Section 404 and permission by the Corps pursuant to Section 14 of the Rivers and Harbors Act of 1899 (i.e., “Section 408”). This decision is a major federal action with the potential to significantly affect the quality of the human environment; therefore, the Corps determined that an environmental impact statement (EIS) would be required.

**PUBLIC REVIEW AND COMMENT**

A draft EIS (DEIS) was prepared to describe the environmental impacts associated with the alternatives available to the Corps: the Applicant Preferred Alternative – ASB Setback Levee Alternative, the Intermediate Setback Levee Alternative, the Levee Strengthening Alternative, and the No-Action Alternative. The Corps circulated the DEIS on July 11, 2008. A Notice of Availability (NOA) was published in the Federal Register on July 11, 2008, and a public meeting on the DEIS was held by the Corps on August 4, 2008, in Marysville. The 45-day public review period ended on August 25, 2008. This final EIS (FEIS) has been prepared to respond to agency and public comments received on the DEIS. The DEIS analysis is republished in this FEIS, with modifications and additions provided in response to comments received on the DEIS. The Corps is circulating this FEIS for public review before making a decision on the project. The DEIS and this FEIS have been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality (CEQ) regulations 40 Code of Federal Regulations (CFR) 1500–1508, and the Corps’ Procedures for Implementing NEPA, Engineer Regulation 200-2-2.

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## ABBREVIATIONS AND ACRONYMS

|                |                                                                             |
|----------------|-----------------------------------------------------------------------------|
| AADT           | Annual average daily traffic                                                |
| ACHP           | Advisory Council on Historic Places                                         |
| ADT            | Average Daily Traffic                                                       |
| AEP            | annual exceedance probability                                               |
| af             | acre-feet                                                                   |
| AGT            | aboveground storage tank                                                    |
| AP             | Applicant Preferred Alternative – Above Star Bend Setback Levee Alternative |
| APE            | Area of Potential Effect                                                    |
| APN            | assessors parcel number                                                     |
| ARB            | California Air Resources Board                                              |
| ASB            | Above Star Bend                                                             |
| ASTM           | American Society for Testing and Materials                                  |
| BA             | biological assessment                                                       |
| BACT           | best available control technology                                           |
| Bay-Delta      | San Francisco Bay/Sacramento-San Joaquin Delta                              |
| bsg            | below surface grade                                                         |
| BMP            | best management practice                                                    |
| BO             | biological opinion                                                          |
| BOSC           | Board of Senior Consultants                                                 |
| B.P.           | Before Present                                                              |
| BTEX           | Benzene, Toluene, Ethylbenzene, and Xylene                                  |
| CALFED program | CALFED Bay-Delta Program                                                    |
| Caltrans       | California Department of Transportation                                     |
| CCR            | California Code of Regulations                                              |
| CCRs           | Conditions, Covenants and Restrictions                                      |
| CDMG           | California Division of Mines and Geology                                    |
| CEQ            | Council on Environmental Quality                                            |
| CEQA           | California Environmental Quality Act                                        |
| CERCLA         | Comprehensive Environmental Response, Compensation, and Liability Act       |
| CESA           | California Endangered Species Act                                           |
| CFR            | Code of Federal Regulations                                                 |



|         |                                                                                                      |
|---------|------------------------------------------------------------------------------------------------------|
| cfs     | cubic feet per second                                                                                |
| CHABA   | Committee of Hearing, Bio Acoustics, and Bio Mechanics                                               |
| CNDDDB  | California Natural Diversity Database                                                                |
| CNEL    | community noise equivalent level                                                                     |
| CNPS    | California Native Plant Society                                                                      |
| CO      | carbon monoxide                                                                                      |
| Corps   | U.S. Army Corps of Engineers                                                                         |
| CRHR    | California Register of Historic Resources                                                            |
| CUP     | conditional use permit                                                                               |
| cu. yd. | cubic yard(s)                                                                                        |
| CVFPB   | Central Valley Flood Protection Board<br>(formerly the Reclamation Board of the State of California) |
| CWA     | Clean Water Act                                                                                      |
| dBA     | A-weighted decibel(s)                                                                                |
| DDT     | Dichlorodiphenyltrichloroethane                                                                      |
| DEIR    | draft EIR                                                                                            |
| Delta   | Sacramento-San Joaquin River Delta                                                                   |
| DFG     | California Department of Fish and Game                                                               |
| DPR     | California Department of Parks and Recreation                                                        |
| DRO     | Diesel-Range Organics                                                                                |
| DSM     | deep soil mixing                                                                                     |
| DWR     | California Department of Water Resources                                                             |
| EA      | Environmental Assessment                                                                             |
| EIS     | environmental impact statement                                                                       |
| EIR     | environmental impact report                                                                          |
| EO      | Executive Order                                                                                      |
| EPA     | U.S. Environmental Protection Agency                                                                 |
| ERP     | Ecosystem Restoration Program                                                                        |
| ESA     | federal Endangered Species Act                                                                       |
| ESU     | Evolutionarily Significant Unit                                                                      |
| FAF     | frequently activated floodplain (also referred to as floodplain activated flood)                     |
| F-BRLSP | Feather-Bear Rivers Levee Setback Project                                                            |
| FCA     | Flood Control Acts of 1917, 1928, and 1941                                                           |

|                 |                                               |
|-----------------|-----------------------------------------------|
| F-CO            | Forecast-Coordinated Operations               |
| FEIR            | final EIR                                     |
| FEMA            | Federal Emergency Management Agency           |
| FMMP            | Farmland Mapping and Monitoring Program       |
| FR              | <i>federal register</i>                       |
| FRAQMD          | Feather River Air Quality Management District |
| FRLRP           | Feather River Levee Repair Project            |
| FTA             | Federal Transit Administration                |
| <i>g</i>        | gravity                                       |
| GCM             | global climate change model                   |
| GRO             | Gasoline-Range Organics                       |
| GRR             | Yuba Basin General Re-Evaluation Report       |
| HSC             | California Health and Safety Code             |
| H:V             | horizontal:vertical                           |
| in/sec          | inches per second                             |
| IPCC            | Intergovernmental Panel on Climate Change     |
| ISL             | Intermediate Setback Levee Alternative        |
| ITE             | Institute of Transportation Engineers         |
| kV              | kilovolt                                      |
| L <sub>dn</sub> | day-night average noise level                 |
| lb/day          | pounds per day                                |
| LOS             | level of service                              |
| LS              | Levee Strengthening Alternative               |
| LSPs            | lattice steel poles                           |
| MLD             | Most Likely Descendant                        |
| mm              | millimeter                                    |
| MOA             | memorandum of agreement                       |
| MRZ             | Mineral Resource Zone                         |
| msl             | mean sea level                                |
| MTBE            | Methyl Tert-butyl Ether                       |
| NAAQS           | national ambient air quality standards        |
| NAHC            | Native American Heritage Commission           |
| NAWQA           | USGS National Water Quality Assessment        |

|                 |                                                  |
|-----------------|--------------------------------------------------|
| NCC             | Natomas Cross Canal                              |
| NCIC            | North Central Information Center                 |
| NEPA            | National Environmental Policy Act                |
| NHPA            | National Historic Preservation Act               |
| NLIP            | Natomas Levee Improvement Program                |
| NMFS            | National Marine Fisheries Service                |
| NOA             | Notice of Availability                           |
| NOAA            | National Atmospheric and Oceanic Administration  |
| NO <sub>2</sub> | nitrogen dioxide                                 |
| NO <sub>x</sub> | oxides of nitrogen                               |
| NPDES           | National Pollutant Discharge Elimination System  |
| NRHP            | National Register of Historic Places             |
| NSVAB           | Northern Sacramento Valley Air Basin             |
| O&M             | Operations and Maintenance                       |
| OEHHA           | Office of Environmental Health Hazard Assessment |
| OHWM            | ordinary high water mark                         |
| OPUD            | Olivehurst Public Utility District               |
| PCBs            | Polychlorinated Biphenyls                        |
| PG&E            | Pacific Gas & Electric                           |
| Phase I ESA     | Phase I Environmental Site Assessment            |
| Phase II ESA    | Phase II Environmental Site Assessment           |
| PIR             | Problem Identification Report                    |
| PL              | public law                                       |
| PLM             | Project Levee Mile                               |
| PM              | particulate matter                               |
| PPV             | peak particle velocity                           |
| PRC             | California Public Resources Code                 |
| PRG             | preliminary remedial goal                        |
| RBDD            | Red Bluff Diversion Dam                          |
| RCRA            | Resource Conservation and Recovery Act           |
| RD              | Reclamation District                             |
| RMS             | root mean square                                 |
| ROD             | record of decision                               |

|                 |                                                 |
|-----------------|-------------------------------------------------|
| ROG             | reactive organic gases                          |
| RWQCB           | regional water quality control board            |
| SACOG           | Sacramento Area Council of Governments          |
| SAFCA           | Sacramento Area Flood Control Agency            |
| SHPO            | State Historic Preservation Officer             |
| SMARA           | California Surface Mining and Reclamation Act   |
| SRFCP           | Sacramento River Flood Control Project          |
| SO <sub>2</sub> | sulfur dioxide                                  |
| SR              | State Route                                     |
| SVP             | Society of Vertebrate Paleontology              |
| SWPPP           | Stormwater Pollution Prevention Plan            |
| TAC             | toxic air contaminant                           |
| TDS             | total dissolved solids                          |
| TEL             | thresholds effects level                        |
| TMDL            | total maximum daily load                        |
| TPH             | Total Petroleum Hydrocarbons                    |
| TRLIA           | Three Rivers Levee Improvement Authority        |
| UCMP            | University of California Museum of Paleontology |
| USC             | United States Code                              |
| USFWS           | U.S. Fish and Wildlife Service                  |
| UST             | underground storage tank                        |
| VdB             | vibration decibels                              |
| VOC             | volatile organic compound                       |
| WARN            | wide area rapid notification system             |
| WPIC            | Western Pacific Interceptor Canal               |
| WSA             | Water Supply Assessment                         |
| YCWA            | Yuba County Water Agency                        |
| Y-FSFCP         | Yuba-Feather Supplemental Flood Control Project |
| Yuba County EHD | Yuba County Environmental Health Department     |

# ES EXECUTIVE SUMMARY

## ES.1 INTRODUCTION

Studies by the California Department of Water Resources (DWR), the U.S. Army Corps of Engineers (Corps), Reclamation District (RD) 784, and the Three Rivers Levee Improvement Authority (TRLIA) have found that several reaches of the levee system protecting the RD 784 area, including the lower Yuba River left (south) bank levee and the Feather River left (east) bank levee, do not satisfy geotechnical criteria for seepage at the water surface elevation for the 100-year flood event (Kleinfelder 2006). To correct deficiencies identified along segments of the Feather and Yuba River levees and to improve flood protection within the Reclamation District (RD) 784 area, TRLIA is undertaking the Feather River Levee Repair Project (FRLRP). For planning and design purposes, the levee reaches identified for repairs and improvements in the FRLRP are divided into three project segments (Segments 1, 2, and 3). Improvements to the existing levees in Segments 1 and 3 have independent utility from the improvements in Segment 2. Segments 1 and 3 improvements have been addressed in a separate planning and design effort and were subject to separate permitting processes, which have been completed. An Environmental Assessment and Finding of No Significant Impact for the Segments 1 and 3 work were completed in July 2007, Corps permission under Section 408 was obtained on August 2, 2007, and construction was initiated soon afterward. Proposed improvements to Segment 2, generally consisting of construction of a setback levee and subsequent degradation of the existing levee, compose the project that is the subject of this Environmental Impact Statement (EIS).

The Corps circulated the draft EIS (DEIS) for the Segment 2 project on July 11, 2008. The DEIS described the existing environmental resources in the project area and evaluated and provided full disclosure of the environmental effects of the project alternatives on these resources. A Notice of Availability (NOA) was published in the Federal Register on July 11, 2008, and a public meeting on the DEIS was held by the Corps on August 4, 2008 in Marysville. The 45-day public review period ended on August 25, 2008. This final EIS (FEIS) has been prepared to respond to agency and public comments received on the DEIS. All of the project analysis contained in the DEIS has been republished in this FEIS, which is being circulated to commenting agencies and individuals and to other interested parties. The DEIS and this FEIS have been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality (CEQ) regulations 40 Code of Federal Regulations (CFR) 1500–1508, and the Corps' Procedures for Implementing NEPA, Engineer Regulation 200-2-2.

This FEIS will facilitate Corps planning and regulatory activities in connection with Segment 2 of the FRLRP. The July 2008 DEIS and this FEIS describe the flood control and related problems and needs that would be addressed by the project, identify the Applicant Preferred Alternative – Above Star Bend (ASB) Setback Levee Alternative (also referred to as the “Applicant Preferred Alternative”) and alternatives to the Applicant Preferred Alternative, and present an analysis of the environmental impacts and mitigation measures associated with the Applicant Preferred Alternative and other alternatives. The evaluation of environmental effects addresses direct, indirect, and cumulative impacts. The evaluation of indirect and cumulative impacts considers the relationship between the Applicant Preferred Alternative and other alternatives considered for Segment 2 of the FRLRP, Segments 1 and 3 improvements, other flood protection projects implemented in the RD 784 area (see the discussion titled “Relationship to the RD 784 Flood Control System” in Section ES.3 below), and development projects that may interact with or be influenced by the Applicant Preferred Alternative and other alternatives.

## ES.2 PROJECT PURPOSE

The primary purpose of the project is to correct identified deficiencies in the left bank levee of the Feather River, and consequently to improve flood protection in the RD 784 area of Yuba County. The goal for improved flood protection in the RD 784 area is to provide protection against the 0.5% Annual Exceedance Probability (AEP) event.

Protecting against the 0.5% AEP event corresponds to the term “200-year flood protection”. References in this document to levels of flood protection are based on the deterministic approach (the current Federal Emergency Management Agency [FEMA] method) and should not be taken as Corps concurrence that such levels will be achieved when the Corps probabilistic approach is utilized to define system performance. The probabilistic approach will be used by the Corps when evaluating the Yuba Basin General Re-Evaluation Report (GRR). The GRR is described below in Section ES.6, “Summary of Federal Flood Protection Efforts in the RD 784 Area.” In any case, flood risk to the RD 784 area would be considerably reduced by the proposed project.

Deficiencies in Segment 2 of the Feather River left bank levee are related to a history of boils and heavy underseepage resulting from an overly porous substrate under the levee alignment. The potential for water seepage problems to occur along the existing Feather River levee in the project area is created by discontinuous layers of very loose or loose cohesionless soils (gravels, clean sand, and silty sand) found at varying depths of up to approximately 80 feet. During high-water events, water from the river can enter the pervious gravel layers and then move laterally through these layers and under the levee. Existing hydraulic gradients in Segment 2 are calculated to range from 0.4 to over 1.0, and are estimated to be in excess of 1.0 in the vicinity of Pump Station No. 3 (GEI Consultants 2006a, 2006b). Repairs to the levee would allow a maximum hydraulic gradient of 0.5 at the landside toe of the levee. In addition, sink holes have been observed in different locations, providing evidence of the structural instability. There are also several locations along the water side of the levee segment experiencing erosion. See Section ES.4, “Need for Improved Flood Protection,” for more information. See Chapter 2, “Alternatives,” for further details on project design elements.

## **ES.3 EXISTING LEVEE**

### **ES.3.1 PHYSICAL FEATURES**

The existing Feather River levee alignment along the western boundary of RD 784 follows the east side of the Feather River from the Bear River setback levee tie-in, near Pump Station No. 2, to the Feather River confluence with the Yuba River where the Feather River left bank levee ties into the Yuba River left bank levee. The Feather River and Yuba River levee alignments lie within the floodplain of the Yuba and Feather Rivers and parallel and intersect the sediment-filled channels of past river meanders. The Corps completed construction of the existing levees in 1941. In general, the levee heights range from about 20 to 30 feet. The levee crown widths are about 20 feet, but are wider in some sections. Typical waterside slopes range from 3:1 (horizontal:vertical) (H:V) to 5:1 H:V, and the landside slopes typically range from 2:1 H:V to 3:1 H:V. A landside berm of variable height and width buttresses the levee along extensive portions of the alignment.

Within Segment 2, the majority of the existing levee is bordered on the landside by agricultural properties that typically maintain groves of fruit and nut trees. The area between the waterside toe of the levee and the Feather River main channel varies in width with some areas being actively maintained orchards; the other land along the waterside of the levee is otherwise mostly undeveloped. The levee crown elevation above mean sea level (msl) ranges from 66.2 feet msl to 76.9 feet msl.

The topography along the levee toe is fairly flat and ranges from about 54 feet msl at the northern end of Segment 2, to a low area at about 37 feet msl south of Pump Station No. 3, and to about 46 feet msl at the southern end of the segment. The ground along the landside toe of the berm is at about 31 feet msl, approximately 36 feet below the levee crown.

### **ES.3.2 RELATIONSHIP TO THE RD 784 FLOOD CONTROL SYSTEM**

The Feather River levee is part of a larger system operated by RD 784 that protects approximately 16,500 acres (over 26 square miles) from flooding. The system includes 37 miles of levees and more than 40 miles of internal drainage ditches, as well as 10 pumping stations. The RD 784 levees are identified as:

- ▶ Yuba River south (left bank) levee located along the northern limits of RD 784.
- ▶ Feather River east levee (left bank) located along the western limits of RD 784.
- ▶ Bear River north levee (right bank) located along the southern limits of RD 784.
- ▶ Western Pacific Interceptor Canal (WPIC) west (left bank) levee located along the eastern limits of RD 784.

Four work phases have been identified to improve 29 miles of RD 784 levees along the Yuba River, Feather River, Bear River and the WPIC with the goal of achieving 200-year flood protection for south Yuba County.

### **ES.3.3 LEVEE DESIGN FLOWS**

The existing levees were designed to pass the “objective” flow with 3 feet of freeboard. The objective flows on the Feather River are 210,000 cubic feet per second (cfs) upstream of the Yuba River mouth and 300,000 cfs between the Yuba River and the Bear River. The objective flow on the Yuba River is 120,000 cfs when the flow in the Feather River at Yuba City is 180,000 cfs, and 180,000 cfs when flow in the Feather River is “low.”

### **ES.4 PROJECT AREA**

The RD 784 area of Yuba County is generally bounded by the Yuba River on the north, the Feather River on the west, the Bear River on the south, and the WPIC on the east. A small portion of the RD 784 boundary does extend east of the WPIC. The Yuba and Bear Rivers are tributaries to the Feather River, and the WPIC connects with the Bear River upstream of the confluence with the Feather River. (See Figures 1-1 and 1-2 in Chapter 1, “Purpose of and Need for Action.”)

The existing Feather River levee in Segment 2 is part of the federal-state Sacramento River Flood Control Project (SRFCP) within an easement obtained by the State of California through the Sacramento–San Joaquin Drainage District. Segment 2 of the FRLRP is located in southwestern Yuba County, and encompasses a portion of the Feather River left bank levee and lands to the east between Feather River Project Levee Mile (PLM) 17.2 and PLM 23.4 (from approximately Star Bend upstream to near Shanghai Bend, southwest of the Yuba County Airport). This section of levee is approximately 6.2 miles long. The applicant proposed setback levee footprint covers approximately 250 acres, and the area between the proposed setback levee alignment and the existing levee encompasses approximately 1,300 acres. Project activities would generally be located in the area between the existing levee and the setback levee, although borrow material is proposed to be obtained from lands east of the setback levee alignment. Refer to Chapter 2, “Alternatives,” for further details on the Applicant Preferred Alternative – ASB Setback Levee Alternative.

### **ES.5 NEED FOR IMPROVED FLOOD PROTECTION**

Yuba County has a long history of flooding. Several conditions combine to pose unique challenges for flood control operations in the Yuba-Feather River system. Historical accounts during the 1800s describe repeated occurrences of large floods on the Feather and Yuba Rivers. Despite the construction of a system of flood control levees beginning in the early 20<sup>th</sup> century, multiple recorded floods occurred in the 1900s, and five major floods—in 1950, 1955, 1964, 1986, and 1997—caused substantial property damage and loss of life. The floods of 1986 and 1997 were especially catastrophic for Yuba County. In January 1997, a levee break occurred on the Feather River north of Star Bend. More than 100,000 people were evacuated from the region during the 1997 flood, which inundated approximately 16,000 acres, damaged or destroyed 800 homes and businesses, and took the lives of three local residents (Yuba County Water Agency 2003a).

There is a history of levee distress and levee failure in the Yuba–Feather River area. Of the levee failures that have occurred during the past several decades, three have been attributed, at least partially, to underseepage. Adverse seepage conditions have resulted in continued loss of foundation soils. Internal erosion (or “piping”) of foundation and/or levee materials is a progressive failure mechanism if not arrested. The loss of soil creates



cavities that can then collapse and manifest themselves as sinkholes. The levee failed catastrophically just north of Country Club Road in January 1997 due to piping of levee and/or foundation sand materials.

Several areas in Segment 2 of the Feather River left (east) bank levee have a history of boils and heavy underseepage, and sink holes have been observed in different locations, providing evidence of the structural instability of this levee segment.

The levees in the entire Sacramento flood control system, including the Feather River east bank levee, were authorized under the Flood Control Act (FCA) of 1917 and subsequently amended by the FCA of 1928, River and Harbor Act of 1938, and the FCA of 1941. From the 1950s to the present, the Corps has implemented major modifications, reconstructions, and upgrades over the years in Segment 2 of the Feather River left bank levee in response to deficiencies identified during flood events. However, this levee segment still does not meet the design criteria used to certify levees as providing 100-year flood protection under regulations adopted by FEMA or the design criteria used by the Corps and the state for Federal Project levees.

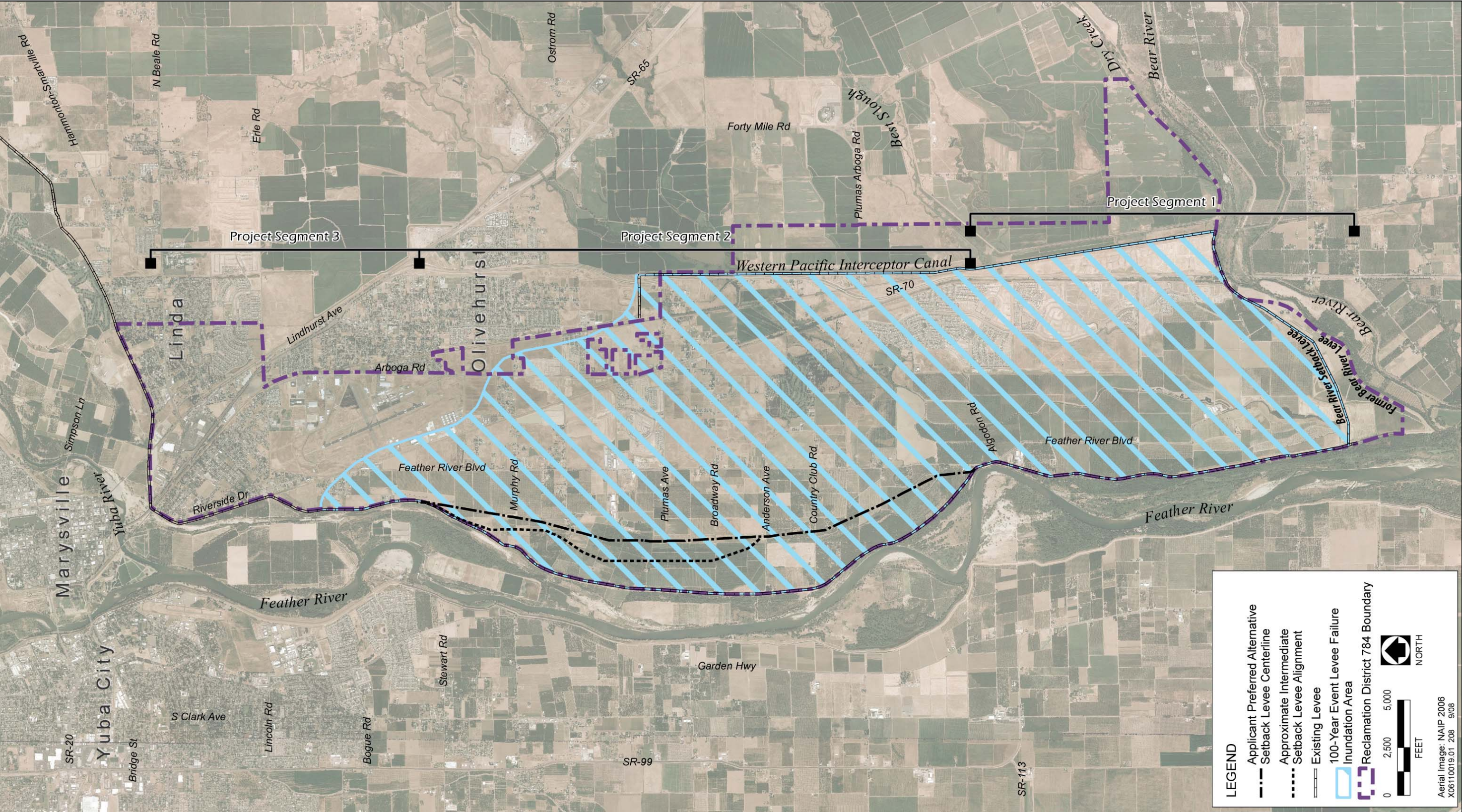
After the numerous events of high water levels and heavy seepage and piping episodes that the levee and its foundation have experienced, it is possible that portions of the foundation of the levee, the adjacent landside and waterside ground, and perhaps the levee itself, are damaged (i.e., a network of “pipes” or erosional conduits or cavities may have developed that naturally help drain the foundation mass but are inherently unstable). Based on the long-term seepage-related distress at the project area, the history of poor levee performance in the larger Yuba–Feather River area, and the observations of heavy seepage during a moderate high-water event in January 2006 (which was about 10 feet lower than the 200-year design flood elevation in the subject reach), it is considered likely that the integrity of the existing levee and foundation is compromised in its current condition. The potential for a future underseepage failure is significant unless the levee and its foundation are further repaired.

Available data indicate that a future flood event with a 5% or greater probability of occurring could cause a major levee failure in Segment 2 (TRLIA 2006c). This potential was evidenced by the reactivation in 2006 of historical boils along the Segment 2 levee that had been believed to be permanently repaired by construction measures undertaken by the Corps in 1997 following the 1997 Feather River levee break. In the event of a levee failure, large portions of the RD 784 area could be inundated, as occurred following the 1955, 1986, and 1997 levee breaks. Figure ES-1 shows the area currently provided flood protection by the Segment 2 levee, identifying lands in the RD 784 area that would be inundated if a levee breach were to occur in Segment 2 when flows in the Feather River correspond to the 100-year flood event. Figure ES-1 also shows the RD 784 boundary and the levees that are part of the RD 784 system. The inundation area covers approximately 13,400 acres. This inundation area also corresponds closely to the area that would be affected if a levee breach were to occur in Segment 2 during a 200-year flood event. As floodwaters flow downgradient to the south in the RD 784 area they are blocked by the land side of the Bear River levee. If there is a sufficient volume of water, the floodwaters eventually breach or overtop the land side of the Bear River levee and drain into the Bear River channel. This was the case during the 1997 flood event. Once the Bear River levee breaches or overtops from the land side, the RD 784 area drains to the Bear River and flood elevations no longer increase in the RD 784 area. Flows resulting from a levee breach in Segment 2 during a 100-year event are close to those needed to result in overtopping of the land side of the Bear River levee. Therefore, the inundation area resulting from a levee breach in Segment 2 for flood events larger than a 100-year flood (including a 200-year flood) are not appreciably different from those shown in Figure ES-1. Consequently, the inundation area shown in Figure ES-1 can be considered the area that would be protected if the Segment 2 levee were repaired to the point of providing 200-year flood protection.

Within the approximately 13,400 acre Segment 2 levee breach inundation area are;

- ▶ approximately 4,000 homes;
- ▶ approximately 10,400 residents;





Source: GEI Consultants 2008, Yuba County 2008, EDAW 2008, RD 784 2008

Feather River Segment 2 Levee 100-Year Event Levee Failure Inundation Area

Figure ES-1



- ▶ over 30 agricultural, industrial, and commercial facilities ranging in size from very small equipment maintenance and repair facilities to a large fruit packing plant;
- ▶ a golf course and country club;
- ▶ three elementary schools;
- ▶ a fire station;
- ▶ approximately 745 acres of natural habitats;
- ▶ over 9,500 acres of agricultural land, including approximately 7,000 acres of important farmland;
- ▶ approximately 2,000 full time equivalent jobs supported by the development and agricultural land in the inundation area;
- ▶ approximately 6 miles of State Route (SR) 70, the primary north/south connector between the Marysville/Yuba City and Sacramento metropolitan areas; and
- ▶ over 15 towers supporting the 115-kilovolt (kV) Bogue Loop electrical transmission line which serves more than 12,000 connections.

*(Data provided above is based on information provided by Yuba County, U.S. Census Bureau data, field surveys of the inundation area, review of aerial photographs, and data for areas with similar conditions)*

A conservative estimate of flood damage costs results in more than \$528 million in flood damages resulting from a Segment 2 levee breach during a 100-year flood event, based simply a median home value estimate of \$250,000 (low estimate based on real estate industry data); assuming, on average, funds equaling 50% of the home value would be required for post flood repairs and replacement of personal property, and \$4,000 per acre of lost crop value on agricultural lands (\$4,000 value based on average TRLIA payments to local agricultural operators losing one season of crops). This cost does not include damage to public facilities, infrastructure, recreational facilities, and businesses, and other potential cost mechanisms such as temporary job losses. As state above, the 1997 flood resulted in three deaths. Although another levee breach would result in significant social costs due to evacuations; losses of homes, property, and jobs; and personal and economic disruptions during reconstruction; it is unclear what the cost in human life might be. Although the number of deaths could be less due to improved local evacuation and emergency response planning, such as implementation of a reverse 911 system, the increased development in since the 1997 flood puts significantly more people at risk if a levee failure were to occur. The time and location of a levee breach, water levels when the breach occurred, and potential for advance warning (i.e., monitoring of boils) would all play a role in the effectiveness of evacuation efforts and the potential for loss of life.

The risk of another major flood in the RD 784 area also would likely lead to the designation of the RD 784 area as a fully restricted Special Flood Hazard Area under the regulations of the National Flood Insurance Program. Such a designation would prevent construction of new buildings and other damageable structures in the area where planned development has already progressed over the past several years, and could preclude federal investment or support for improving existing facilities. Such a designation could have a substantial adverse effect on house sales, the local economy, public facilities, and the provision of public services.

The need for the Applicant Preferred Alternative – ASB Setback Levee Alternative is to reduce the increased risk and probability of flooding events in the RD 784 service area as a result of the identified deficiencies in the Feather River east bank levee, thus minimizing the potential for catastrophic flooding where homes would be inundated, agricultural operations and other businesses would be damaged and destroyed, and where there would be a significant social impact as well as potential for loss of life.

The need for TRLIA to increase the level of protection to the 0.5% AEP event (i.e., 200-year level of flood protection) is required in part to meet established design standards. The levees in the SRFCP, including the Feather River Segment 2 levee, were built to a design stage commonly referred to as the “1957 design profile.” The “1957 design profile” corresponds to a particular water elevation. When the Corps transferred the SRFCP to the State of California for operation and maintenance, the Corps concluded that the levees met all engineering standards to pass the design flow at the design stage. This is documented in the 1953 Memorandum of Understanding (MOU) between the Corps and the Reclamation Board (on behalf of the State of California). The Reclamation Board (now the Central Valley Flood Protection Board [CVFPB]), in conjunction with the Corps, are required to maintain the SRFCP levees to this condition. However, based on application of current engineering standards for levee design and consideration of new geotechnical data for the SRFCP, it is clear that many of the SRFCP levees, including the Feather River Segment 2 levee, do not meet current engineering standards at the “1957 design profile.”

In the reach of the Feather River encompassing FRLRP Segment 2, there is no substantive difference between the 200-year water surface elevation and the “1957 design profile” (see Appendix E in this EIS, October 17, 2007, Technical Memorandum, Figure 4). This is because the “1957 design profile” was computed before the construction of Oroville and New Bullards Bar dams and before the enlargement of the Feather River channel that has occurred over the last half century from the erosion of historic hydraulic mining debris. Due to the increased management of flows from upstream reservoirs and increased size of the Feather River channel from mining debris washing downstream, the water surface elevation corresponding to the “1957 design profile” in the FRLRP Segment 2 area is almost the same elevation that occurs when Feather River flow volumes match the 200-year event. Therefore, for repairs to the FRLRP Segment 2 levee to meet all engineering and design standards at the “1957 design profile”, the levee must, in effect, also provide a 200-year level of flood protection.

The FRLRP Segment 2 levee must also provide a 200-year level of flood protection to comply with the Central Valley Flood Protection Act of 2008 (Act) passed by the California legislature. Because of the potentially catastrophic consequences of flooding in the California Central Valley, the Act recognizes that the Federal government’s current 100-year flood protection standard is not sufficient to protect urban and urbanizing areas within flood-prone areas throughout the Central Valley and declares that the minimum standard for these areas is a 200-year level of flood protection. Due to existing development in the area protected by the FRLRP Segment 2 levee (e.g., approximately 4,000 homes), the 200-year level of flood protection required by the Central Valley Flood Protection Act of 2008 applies to this area.

Having the FRLRP Segment 2 levee provide a 200-year level of flood protection could represent an unacceptable transfer of flood risk to adjacent or downstream levee districts because of the reduction in frequency in which flood waters enter the RD 784 area. This could potentially create some degree of risk that flood water may be redirected to another basin upstream or downstream of the protected area. The question is whether the impacts of such risk shifting are significant and warrant compensatory measures outside of RD 784. The existing FRLRP Segment 2 levee has been determined to have geotechnical deficiencies and the correction of levee deficiencies that could cause a levee failure at less than the “1957 design profile” must be completed. These actions do not represent a transfer of risk or an unacceptable impact to the system because the system was intended to carry the “1957 design profile.” An example of a similar condition would be erosion that has substantially damaged a levee. This erosion must be repaired so the levee performs to its original design standards and does not represent a transfer of risk or an unacceptable change from the existing condition. In addition, as discussed above, the planned design standard of protecting against the 200-year water surface elevation is not different from protecting against the “1957 design profile.” Therefore, the decreased risk of levee failure does not affect the intended performance of the FRLRP Segment 2 levee or other parts of the SRFCP. The decreased risk of levee failure is consistent with the design intent of the SRFCP, which did not rely on upstream levee failures to protect downstream floodplains.

## ES.6 SUMMARY OF FEDERAL FLOOD PROTECTION EFFORTS IN THE RD 784 AREA

Two major federal flood protection efforts addressing the RD 784 area, the System Evaluation Project and the Yuba Basin Project, resulted from the 1986 Central Valley floods and led to additional levee improvements in the RD 784 area. Most of the System Evaluation Project levee reconstruction work in RD 784 was completed in 1998. The additional seepage problems identified following the 1997 flood led to the Corps' System Evaluation Site 7 Extension project, which was completed in 2004.

The Yuba Basin Project led to a Corps project designed to achieve what was then considered to be a "200-year" level of protection for RD 784 levees. The Corps in 1998 completed a feasibility study, Congress authorized the project in the Water Resources Development Act of 1999, and a construction start was authorized in 2002. The authorized project included levee modifications on two levee sections along the Yuba and Feather Rivers, as well as a large portion of the Marysville ring levee north of the RD 784 area. The objective of the project was to reduce the risk of flooding in RD 784's service area in a given year to less than the 1 in 200 year storm event and in Marysville to less than the 1 in 300 year storm event.

In 2003, new Corps underseepage guidelines led to reevaluation of the project, which substantially increased the estimated cost. Because of this cost increase, the Yuba Basin Project must be reauthorized by Congress. A Yuba Basin General Re-Evaluation Report (GRR) is being prepared for submission to Congress for a new authorization and is expected to be available to Congress for its consideration in 2009. The earliest that federal construction under the Corps reauthorized project could begin will be 2011.

Portions of the planned Yuba Basin Project work that overlap with flood system improvements planned and implemented by the Yuba County Water Agency (YCWA) and TRLIA are described below. The Applicant Preferred Alternative – ASB Setback Levee Alternative evaluated in this EIS, which would be implemented by TRLIA, is scheduled to be initiated prior to the GRR submittal date, with the expectation that the flood protection improvements that are constructed in advance of any Congressional action on the GRR will be found to be consistent with the recommendations contained in the GRR. On that basis, TRLIA anticipates that the non-federal costs incurred in implementation of the Applicant Preferred Alternative could be credited against the remaining non-federal share of the cost of the Yuba Basin Project. More specifically, requests for general credit for flood control under Section 104 of the Water Resources Development Act of 1986 (Public Law [PL] 99-662) would allow the work performed by TRLIA and described in the GRR to be partially credited against the local cost sharing requirements of the federal Yuba Basin Project as long as the project features constructed are compatible with the Corps' project. However, an internal Corps memorandum dated April 11, 2008 from Steven L. Stockton, P.E., Director of Civil Works, to the Commander, South Pacific Division (Stockton, pers. comm., 2008) states that if the Segment 2 project sponsor (i.e., TRLIA) desires Section 104 credit for FRLRP Segment 2 work, construction (award of first contract) cannot be initiated until written approval is provided by the Corps. Corps approval would include Section 408 authorization (33 USC 408) and authorization under Section 404 of the federal Clean Water Act (CWA) (33 USC 1344). Regardless of potential future 104 credit, because implementation of the Applicant Preferred Alternative or other alternatives by TRLIA does not immediately use federal funds, it would not result in a commitment of federal resources that would prejudice selection of a GRR alternative before a final decision on the GRR alternatives is made. In addition, the Applicant Preferred Alternative and other alternatives considered in this EIS are restricted to Segment 2 of the Feather River. This is only a small portion of the overall flood protection system considered in the GRR. Implementation of the Applicant Preferred Alternative or other alternatives by TRLIA would have little effect on the overall flood protection system considered in the GRR.

In addition to the efforts described above, most recently, the Corps installed four relief wells around the Pump Station No. 3 intake ditch. This work was in response to the appearance of boils in the intake channel, seeps just north of Pump Station No. 3, and boils and seeps along the toe of the seepage berm downstream of the pump

station and 300 feet landward of the levee toe during a moderate high-water event in January 2006. Construction was completed in November 2006.

## **ES.7 YUBA-FEATHER SUPPLEMENTAL FLOOD CONTROL PROJECT**

In response to the catastrophic flood of 1997, YCWA initiated a program of flood control studies to identify methods to achieve a higher level of flood protection to Yuba County, particularly for the areas in RD 784 that had been subject to flooding several times in the past. The goal of this effort was to substantially improve the flood protection that would be provided by the System Evaluation Project and the Yuba Basin Project. As part of this effort, YCWA identified and evaluated a collection of elements representing a comprehensive range of available technology that could provide portions or all of the objective flood control protection (Yuba County Water Agency 2003a).

Following the passage of the Costa-Machado Water Act of 2000 (Water Act of 2000) by California voters, YCWA's flood control study team turned the focus of its studies to those measures that could be achieved within the budget provisions of the Water Act of 2000. This effort is the Yuba-Feather Supplemental Flood Control Project (Y-FSFCP).

As part of the Y-FSFCP studies, YCWA prepared a feasibility study that evaluated combinations of three flood control elements (Yuba County Water Agency 2003b):

- ▶ an outlet capacity increase at YCWA's New Bullards Bar Reservoir,
- ▶ forecast-coordinated operations of New Bullards Bar Reservoir and DWR-managed Lake Oroville, and
- ▶ a setback of the left (east) bank levee of the Feather River between Shanghai Bend and the Bear River in two segments.

The Above Star Bend (ASB) levee setback evaluated for the Y-FSFCP was proposed to extend approximately 5.2 miles along the Feather River, from southwest of the Yuba County Airport to 1 mile downstream of Star Bend, which approximates the extent of the Segment 2 setback levee that is the Applicant Preferred Alternative – ASB Setback Levee Alternative under evaluation in this EIS. The EIR for the Y-FSFCP was certified and the program of elements approved by the YCWA Board in 2004. Additional planning is ongoing between DWR and YCWA to implement forecast-coordinated operations. However, as a result of additional Corps studies, funding from the Water Act of 2000 and local efforts were redirected from a New Bullards Bar outlet capacity increase and Feather River levee setback to address a more comprehensive program of levee improvements for the RD 784 area.

## **ES.8 DEVELOPMENT HISTORY IN THE RD 784 AREA AND IDENTIFICATION OF ADDITIONAL LEVEE DEFICIENCIES**

In 1993, following the initiation of the System Evaluation Project and the Yuba Basin Project, and before the most recent devastating flood (in 1997), Yuba County had approved the Plumas Lake Specific Plan, a mixed-use development which provides for 12,000 homes on 5,200 acres in the southern portion of the RD 784 area. Development was initiated in the Plumas Lake Specific Plan area in 2002. To date, primarily residential land uses have been developed in the plan area, with approximately 3,200 of the approximately 12,000 planned homes being built. There are also three elementary schools, a fire station, and a small amount of retail development in the Plumas Lakes area.

In May 2003, while YCWA was completing the first level of Y-FSFCP studies described above, the Corps, in a separate draft floodplain mapping study for DWR on the Feather River and its tributaries, identified several deficiencies in freeboard on the Bear River and WPIC levees that prevented these levees from meeting the FEMA

accreditation requirements for protecting RD 784 from a “100-year” flood event. (The top of the levee must be at least 3 feet higher than the 100-year event.) This information was unexpected by Yuba County officials because the 1998 Corps Yuba River Basin study did not recommend any work for the Bear River and WPIC levees to achieve a 200-year level of protection for the RD 784 area. In addition, it was found that a 2,800-foot stretch of the Yuba River levee on the upstream side of SR 70 did not meet slope stability requirements. The results of the 2003 Corps floodplain mapping study indicate that the people and property in the RD 784 area, including homes that had already been built in the Plumas Lake Specific Plan area before the release of the Corps study, are subject to a much higher flood risk than previously believed. These issues were seen as a major setback to the long-term plan to increase the level of flood protection to a 200-year and eventually greater level of protection.

Without levee improvements that FEMA can accredit as providing protection against the 1% chance annual flood, FEMA may publish new Flood Insurance Rate Map (FIRM) panels for the RD 784 area. Once the FIRM panels are published, flood insurance rates for the area may increase, and carrying flood insurance would become mandatory. Consequently, YCWA, RD 784, and Yuba County, in consultation with many landowners and developers in the south county, elected to move aggressively on a program for evaluating options for achieving FEMA accreditation of the RD 784 levees. One step was the formation of TRLIA, a joint powers authority composed of Yuba County and RD 784 that was formed to address funding and implementation of levee repairs for the RD 784 area.

Once levee repairs are complete in the RD 784 area, and lands are not considered within the FEMA 100-year floodplain, flood protection will no longer be considered a barrier to future planned development. Repairs to the FRLRP Segment 2 levee would remove a portion of the RD 784 area from the 100-year floodplain, and would remove flood protection as an obstacle to growth for the Plumas Lake Specific Plan area described above, as well as additional planned development projects. Development of these projects would result in additional people residing in an area currently considered within the Feather River floodplain.

## **ES.9 TRLIA’S PHASED PROGRAM**

Since 2003, various studies have been completed to determine necessary actions for RD 784 levees to meet current FEMA accreditation requirements as well as provide a 200-year level of flood protection. Based on the results of these studies, flood control improvements were planned by TRLIA for implementation in four phases, as described below, with the intent to construct those features that would most economically provide the desired level of flood protection. The Applicant Preferred Alternative – ASB Setback Levee Alternative is part of Phase 4. Most of the projects listed below in Table ES-1 have been completed. The remaining projects that are part of Phase 4 are underway or planned. TRLIA anticipates that the GRR described above will include many of these features that TRLIA has constructed and that Section 104 credits will be provided to TRLIA for the completed early implementation work.

## **ES.10 ALTERNATIVES**

Four project alternatives were evaluated in the DEIS. The DEIS analysis is republished in this FEIS, with modifications and additions provided in response to comments received on the DEIS. The elements of the four alternatives are described below, and the characteristics and key environmental effects of the alternatives are summarized in Table ES-2. Each action alternative addresses repair of the FRLRP Segment 2 levee (Figure ES-1) in order to meet the goal of providing protection against the 0.5% AEP event. As described above, Figure ES-1 shows the approximately 13,400-acre area that would be inundated if a levee breach were to occur in Segment 2 when flows in the Feather River corresponded to the 100-year flood event.



**Table ES-1**  
**TRLIA's Four-Phase Program of Flood Control Improvements for Southwestern Yuba County**

| Program Phase                                                                                     | Location in the RD 784 Area                                                                                       | Type of Improvement                                                                                                                                                                                                                                                        |
|---------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Phase 1 Improvements (completed 2004)                                                             | Yuba River Levee                                                                                                  | Construction of a 50-foot-deep slurry cutoff wall through the top of the levee from SR 70 to a site that breached in 1986, for a total length of 2,200 feet                                                                                                                |
| Phase 2 Improvements (completed 2005)                                                             | Yuba River Levee                                                                                                  | Construction of 90- and 300-foot-wide landside seepage berms to protect against underseepage                                                                                                                                                                               |
|                                                                                                   | Olivehurst Detention Basin                                                                                        | Improvements to major drain channels in the Olivehurst basin to accommodate 100-year flows; construction of a detention basin to store floodwaters                                                                                                                         |
|                                                                                                   | WPIC Levee                                                                                                        | Construction of a 500-foot-long, 38-foot-deep slurry cutoff wall and a 1,100-foot-long, 44-foot-deep slurry cutoff wall to minimize underseepage at Plumas Lake; filling of an existing landside toe ditch to provide protection against underseepage                      |
|                                                                                                   | Upper Bear River Levee                                                                                            | Reconstruction of 300 feet of levee and rock slope protection at the confluence with the WPIC to provide erosion protection                                                                                                                                                |
| Phase 2 Improvements (completed 2006)                                                             | Olivehurst Detention Basin                                                                                        | Construction of a ring levee between SR 70 and the Clark Lateral levee                                                                                                                                                                                                     |
|                                                                                                   | WPIC Levee                                                                                                        | Construction of a levee crown raise to provide adequate freeboard                                                                                                                                                                                                          |
|                                                                                                   | Upper Bear River Levee                                                                                            | Construction of a levee crown raise to provide adequate freeboard and a waterside impervious zone to prevent through-seepage                                                                                                                                               |
|                                                                                                   | RD 784 Pump Station No. 6                                                                                         | Removal of the pump station and installation of a new pump station to protect against underseepage at the Algodon Canal                                                                                                                                                    |
| Phase 3 Improvements (completed 2006)                                                             | Lower Bear River Levee                                                                                            | Construction of a 2-mile-long setback levee to replace 3 miles of existing levee at the confluence of the Bear and Feather Rivers and associated infrastructure (e.g., detention basins, relief wells) and habitat restoration plantings                                   |
| Phase 4 Improvements (completed 2006)                                                             | Upper Yuba River Levee                                                                                            | Construction of a cutoff wall between the Union Pacific Railroad track and Simpson Lane to protect against underseepage has been completed; related work to fill a ditch along the water side of the Yuba River levee east of Simpson Lane near the Goldfields is planned  |
| Phase 4 Improvements (construction began in fall 2007 and is planned for completion in fall 2008) | FRLRP Segments 1 and 3 (separately planned, permitted, and designed from the work that is proposed for Segment 2) | Repair and strengthening the existing levees in place to correct these deficient levee segments; levee repairs consist primarily of installation of slurry cutoff walls, stability berms, waterside blankets, and relief wells at various locations along Segments 1 and 3 |
| Phase 4 Improvements (proposed)                                                                   | FRLRP Segment 2; the subject of this EIS, described in Chapter 2                                                  | Proposed construction of a setback levee and degradation of the existing levee in Segment 2                                                                                                                                                                                |
| Source: Provided by TRLIA in 2007                                                                 |                                                                                                                   |                                                                                                                                                                                                                                                                            |

**Table ES-2**  
**Summary Comparison of the Characteristics and Key Environmental Effects of the Alternatives**

| Environmental Effect or Project Characteristic                                                                                                                                                                                                    | Applicant Preferred (AP) Alternative – Above Star Bend (ASB) Setback Levee Alternative                                                                                                                                                                                                                                                                                                                                                                                                                                     | Intermediate Setback Levee (ISL) Alternative                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Levee Strengthening (LS) Alternative                                                                                                                                                                                                                                                                                                                                                                                                                                                         | No-Action Alternative                                                                         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| <b>Land Use and Agriculture</b>                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                               |
| Convert Important Farmland to Nonagricultural Uses                                                                                                                                                                                                | <ul style="list-style-type: none"> <li>• 290 acres directly converted within setback levee alignment and borrow areas.</li> <li>• Up to 525 acres directly converted to habitat in the setback area.</li> <li>• 1,250 acres in flood-protected area currently planned for future development. Flood protection removes obstacle to development.</li> <li>• 4,790 acres in flood-protected area not currently planned for future development. Flood protection removes obstacle to potential future development.</li> </ul> | <ul style="list-style-type: none"> <li>• 270 acres directly converted within setback levee alignment and borrow areas.</li> <li>• Up to 360 acres directly converted to habitat in the setback area.</li> <li>• 1,250 acres in flood-protected area currently planned for future development. Flood protection removes obstacle to development.</li> <li>• 4,990 acres in flood-protected area not currently planned for future development. Flood protection removes obstacle to potential future development.</li> </ul> | <ul style="list-style-type: none"> <li>• 30 acres directly converted, mostly from construction of seepage stability berms.</li> <li>• No acreage converted to habitat.</li> <li>• 1,250 acres in flood-protected area currently planned for future development. Flood protection removes obstacle to development.</li> <li>• 6,045 acres in flood-protected area not currently planned for future development. Flood protection removes obstacle to potential future development.</li> </ul> | Significant chance for reduction in agricultural productivity from flood events               |
| <b>Geology and Soils</b>                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                               |
| Exposure of Persons or Property to Geologic Hazards, Such as Ground Shaking, Liquefaction, Landslides, Land Subsidence, or Erosion; Location on a Geologic Unit or Soil That Is Unstable or That Would Become Unstable as a Result of the Project | Greater levee stability and resistance to seismic damage relative to existing conditions. At least two-thirds of setback levee alignment placed on desirable foundation geologic unit (i.e., Modesto formation).                                                                                                                                                                                                                                                                                                           | Increase in levee stability and resistance to seismic damage, but not as great as the AP. Approximately half of setback levee alignment placed on Modesto formation geologic unit.                                                                                                                                                                                                                                                                                                                                         | Increased levee stability and minor increase in resistance to seismic damage, but substantially less assurance of levee stability compared to the AP or ISL due to foundation soils. Levee alignment remains on porous alluvial deposits.                                                                                                                                                                                                                                                    | Continued significant level of geologic hazard, levee erosion, and potential for levee breach |

**Table ES-2**  
**Summary Comparison of the Characteristics and Key Environmental Effects of the Alternatives**

| Environmental Effect or Project Characteristic                                                                                                              | Applicant Preferred (AP) Alternative – Above Star Bend (ASB) Setback Levee Alternative                                                                                                                                  | Intermediate Setback Levee (ISL) Alternative                                                                                                                                                                                              | Levee Strengthening (LS) Alternative                                                    | No-Action Alternative                                                                                                                    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Water Resources and Geomorphology</b>                                                                                                                    |                                                                                                                                                                                                                         |                                                                                                                                                                                                                                           |                                                                                         |                                                                                                                                          |
| Alter Regional or Local Hydrology, Result In Erosion of the Levee System, or Substantially Increase the Mobilization and/or Deposition of Sediments         | Local and upstream reductions in flood stage elevations. At Feather/Yuba River confluence 1.3 foot reduction during 100-year flows and 1.6 foot reduction at 200-year flows. No significant adverse effects downstream. | Local and upstream reductions in flood stage elevations, but less than AP. At Feather/Yuba River confluence 1.0 foot reduction during 100-year flows and 1.2 foot reduction at 200-year flows. No significant adverse effects downstream. | No change in hydrologic conditions. No significant adverse effects.                     | Significant chance for deposition of sediment associated with levee breach and inundation of and damage to local drainage facilities     |
| Violate Any Water Quality Standards or Waste Discharge Requirements or Otherwise Substantially Degrade Water Quality                                        | No significant adverse effect after mitigation                                                                                                                                                                          | No significant adverse effect after mitigation. Same level of effect as the AP                                                                                                                                                            | No significant adverse effect after mitigation. Same level of effect as the AP          | Significant releases of hazardous materials into waterways if a levee breach were to occur                                               |
| <b>Hazardous Materials</b>                                                                                                                                  |                                                                                                                                                                                                                         |                                                                                                                                                                                                                                           |                                                                                         |                                                                                                                                          |
| Create a Significant Hazard to the Public or the Environment through Release of Hazardous Materials into the Environment                                    | No significant adverse effect after mitigation                                                                                                                                                                          | No significant adverse effect after mitigation. Similar level of effect as the AP                                                                                                                                                         | No significant adverse effect after mitigation. Level of effect less than the AP or ISL | Significant releases of hazardous materials if a levee breach were to occur                                                              |
| <b>Effects to Waters of the U.S., Including Wetlands (out of a total of 114.9 acres of jurisdictional waters of the U.S. in the delineation study area)</b> |                                                                                                                                                                                                                         |                                                                                                                                                                                                                                           |                                                                                         |                                                                                                                                          |
| Direct Removal                                                                                                                                              | 10.9 acres (of that total, 6.7 acres would not be replaced by jurisdictional habitat at the same location and would require compensatory mitigation)                                                                    | 10.9 acres (of that total, 6.7 acres would not be replaced by jurisdictional habitat at the same location and would require compensatory mitigation)                                                                                      | 4.0 acres                                                                               | Chance for fill or disturbance of waters of the U.S., including wetlands, to occur following levee breach. However, cannot be quantified |
| <b>Fisheries</b>                                                                                                                                            |                                                                                                                                                                                                                         |                                                                                                                                                                                                                                           |                                                                                         |                                                                                                                                          |
| Potential Adverse Water Quality Effects on Special-Status Fish Species                                                                                      | No significant adverse effect after mitigation                                                                                                                                                                          | No significant adverse effect after mitigation. Similar level of effect as the AP                                                                                                                                                         | No significant adverse effect after mitigation. Level of effect less than the AP or ISL | Significant releases of hazardous materials into waterways if a levee breach were to occur                                               |

**Table ES-2**  
**Summary Comparison of the Characteristics and Key Environmental Effects of the Alternatives**

| Environmental Effect or Project Characteristic                                                                                 | Applicant Preferred (AP) Alternative – Above Star Bend (ASB) Setback Levee Alternative                                      | Intermediate Setback Levee (ISL) Alternative                                                                                 | Levee Strengthening (LS) Alternative                                                                                                                                        | No-Action Alternative                                                                                                                     |
|--------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Substantially Reduce the Quality and Quantity of Important Habitat for Special-Status Fish Species                             | Expanded floodway increases aquatic habitat. No significant adverse effect                                                  | Expanded floodway increases aquatic habitat, but to a lesser degree than the AP. No significant adverse effect               | No beneficial or significant adverse effects                                                                                                                                | Hazardous materials release or breach could affect quality and quantity of habitat for special-status fish species                        |
| Substantially Reduce Special-Status Fish Populations                                                                           | No significant adverse effect after mitigation                                                                              | No significant adverse effect after mitigation. Similar level of effect as the AP                                            | No significant adverse effect                                                                                                                                               | Significant short term loss of special-status fish from stranding after a levee breach                                                    |
| <b>Terrestrial Biological Resources</b>                                                                                        |                                                                                                                             |                                                                                                                              |                                                                                                                                                                             |                                                                                                                                           |
| Adverse Effects on Special-Status Species: Valley Elderberry Longhorn Beetle, Northwestern Pond Turtle, and Giant Garter Snake | No significant adverse effect after mitigation                                                                              | No significant adverse effect after mitigation. Similar level of effect as the AP                                            | No significant adverse effect                                                                                                                                               | Significant short term loss of special-status species from a levee breach                                                                 |
| <b>Cultural Resources</b>                                                                                                      |                                                                                                                             |                                                                                                                              |                                                                                                                                                                             |                                                                                                                                           |
| Adverse Changes in the Significance of a Historical or an Archaeological Resource                                              | No significant adverse effect after mitigation                                                                              | No significant adverse effect after mitigation. Similar level of effect as the AP                                            | –                                                                                                                                                                           | Potential significant damage to resources from flooding resulting from a levee breach                                                     |
| Disturbance of Previously Unidentified Historical and Archaeological Resources or Human Remains                                | No significant adverse effect after mitigation                                                                              | No significant adverse effect after mitigation. Similar level of effect as the AP                                            | No significant adverse effect after mitigation. Level of effect less than the AP or ISL                                                                                     | Potential significant damage to resources from flooding resulting from a levee breach                                                     |
| <b>Air Quality</b>                                                                                                             |                                                                                                                             |                                                                                                                              |                                                                                                                                                                             |                                                                                                                                           |
| Air Quality Effects of Project Construction Emissions                                                                          | Significant adverse effect: exceeds local Air Quality Management District (AQMD) daily emission thresholds after mitigation | Significant adverse effect: exceeds local AQMD daily emission thresholds after mitigation. Similar level of effect as the AP | Significant adverse effect: exceeds local AQMD daily emission thresholds after mitigation. Level of effect less than the AP and ISL due to smaller area of soil disturbance | Potentially total quantities of air emissions exceeding action alternatives from large-scale earthmoving and cleanup after a levee breach |

**Table ES-2**  
**Summary Comparison of the Characteristics and Key Environmental Effects of the Alternatives**

| Environmental Effect or Project Characteristic                                                                                                                                                                                   | Applicant Preferred (AP) Alternative – Above Star Bend (ASB) Setback Levee Alternative                                                           | Intermediate Setback Levee (ISL) Alternative                                                                                                              | Levee Strengthening (LS) Alternative                                                                                                                                       | No-Action Alternative                                                                                                                                                               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Noise and Vibration</b>                                                                                                                                                                                                       |                                                                                                                                                  |                                                                                                                                                           |                                                                                                                                                                            |                                                                                                                                                                                     |
| Substantial Increase in Noise Levels Above Ambient Levels for Sensitive Receptors; Noise in Excess of Local Noise Regulations                                                                                                    | No significant adverse effect after mitigation                                                                                                   | No significant adverse effect after mitigation. Similar level of effect as the AP                                                                         | No significant adverse effect after mitigation. Level of effect less than the AP or ISL due to shorter total construction period                                           | Noise impacts potentially exceed action alternatives from large-scale earthmoving and cleanup after a levee breach                                                                  |
| <b>Transportation and Circulation</b>                                                                                                                                                                                            |                                                                                                                                                  |                                                                                                                                                           |                                                                                                                                                                            |                                                                                                                                                                                     |
| Substantial Increase in Traffic Hazards on a Local Roadway Resulting from Construction Traffic                                                                                                                                   | No significant adverse effect after mitigation                                                                                                   | No significant adverse effect after mitigation. Similar level of effect as the AP                                                                         | No significant adverse effect after mitigation. Level of effect less than the AP or ISL due to shorter total construction period                                           | During a levee breach and later during large-scale cleanup, significant chance for hazards to create dangerous conditions on roadways compared to action alternatives               |
| <b>Public Services, Utilities, and Service Systems</b>                                                                                                                                                                           |                                                                                                                                                  |                                                                                                                                                           |                                                                                                                                                                            |                                                                                                                                                                                     |
| Increase in Risk of Structural Failure of, or Substantial Interference with Service from Existing Gas Facilities and Pipelines, Electrical Transmission or Distribution Lines, Telephone Lines, or Water Distribution Facilities | No significant adverse effect after mitigation                                                                                                   | No significant adverse effect after mitigation. Similar level of effect as the AP                                                                         | No significant adverse effect after mitigation. Level of effect less than the AP or ISL due to smaller construction disturbance area                                       | Potential for significant damage to communication and utility infrastructure from a levee breach and resulting flooding                                                             |
| Increase in Response Time for Emergency Service Providers                                                                                                                                                                        | No significant adverse effect after mitigation                                                                                                   | No significant adverse effect after mitigation. Similar level of effect as the AP                                                                         | No significant adverse effect after mitigation. Level of effect less than the AP or ISL due to smaller construction disturbance area and shorter total construction period | Potential for significant increase in emergency service response times from a levee breach and resulting flooding and from large-scale earthmoving and cleanup after a levee breach |
| <b>Growth-Inducing Effects</b>                                                                                                                                                                                                   | Removes flood protection as an obstacle to growth in the roughly 12,100-acre area protected by the new Segment 2 ASB setback levee. Pressure for | Removes flood protection as an obstacle to growth in the roughly 12,300-acre area protected by the new Segment 2 intermediate setback levee. Pressure for | Removes flood protection as an obstacle to growth in the roughly 13,400-acre area protected by the existing Segment 2 levee                                                | Does not remove flood protection as an obstacle to growth in the roughly 13,400-acre area protected by the existing Segment 2 levee. No growth-inducing                             |

**Table ES-2**  
**Summary Comparison of the Characteristics and Key Environmental Effects of the Alternatives**

| Environmental Effect or Project Characteristic           | Applicant Preferred (AP) Alternative – Above Star Bend (ASB) Setback Levee Alternative                                                                                           | Intermediate Setback Levee (ISL) Alternative                                                                                                                                     | Levee Strengthening (LS) Alternative                                                 | No-Action Alternative                                                        |
|----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
|                                                          | development removed from the approximately 1,300 acres placed in the floodway.                                                                                                   | development removed from the approximately 1,100 acres placed in the floodway.                                                                                                   |                                                                                      | effects                                                                      |
| <b>Levee Length</b>                                      | Approximately 5.7-mile-long setback levee                                                                                                                                        | Approximately 5.5-mile-long setback levee                                                                                                                                        | Repairs to approximately 6.2 miles of the existing levee                             | Not applicable                                                               |
| <b>Approximate Length of Slurry Cutoff Wall</b>          | 25,500 linear feet                                                                                                                                                               | 29,000 linear feet                                                                                                                                                               | 17,600 linear feet                                                                   | Not applicable                                                               |
| <b>Approximately Length of Bank/Slope Protection</b>     | 0 linear feet                                                                                                                                                                    | 0 linear feet                                                                                                                                                                    | 13,400 linear feet                                                                   | Not applicable                                                               |
| <b>Approximate Soil Borrow Quantity</b>                  | 3.6 million cu. yd.                                                                                                                                                              | 3.6 million cu. yd.                                                                                                                                                              | 1.4 million cu. yd.                                                                  | Not applicable                                                               |
| <b>Construction Costs for Segment 2 Work<sup>1</sup></b> | \$66.1 million <sup>2</sup>                                                                                                                                                      | \$68.2 million <sup>2</sup>                                                                                                                                                      | \$48.4 million <sup>2</sup>                                                          | Not applicable                                                               |
| <b>Land Acquisition Costs<sup>3</sup></b>                | \$61.0 million                                                                                                                                                                   | \$45.0 million                                                                                                                                                                   | \$2.0 million                                                                        | Not applicable                                                               |
| <b>Approximate Financing Costs</b>                       | \$2.6 million                                                                                                                                                                    | \$2.4 million                                                                                                                                                                    | \$1.2 million                                                                        | Not applicable                                                               |
| <b>Total Costs for Segment 2 Work<sup>1</sup></b>        | \$161.0 million <sup>5</sup>                                                                                                                                                     | \$149.0 million <sup>5</sup>                                                                                                                                                     | \$76.0 million <sup>5</sup>                                                          | Inspection and maintenance following existing programs                       |
| <b>Operations and Maintenance Costs</b>                  | \$103,000 per year <sup>6</sup>                                                                                                                                                  | \$99,000 per year <sup>6</sup>                                                                                                                                                   | \$112,000 per year <sup>6</sup>                                                      | \$52,000 per year <sup>7</sup>                                               |
| <b>Flood Protected Acreage</b>                           | Approximately 12,100 acres protected by levee and provided 200-year flood protection. Approximately 1,300 acres placed in Feather River floodway on water side of setback levee. | Approximately 12,300 acres protected by levee and provided 200-year flood protection. Approximately 1,100 acres placed in Feather River floodway on water side of setback levee. | Approximately 13,400 acres protected by levee and provided 200-year flood protection | Approximately 13,400 acres remains with less than 100-year flood protection. |

**Table ES-2**  
**Summary Comparison of the Characteristics and Key Environmental Effects of the Alternatives**

| Environmental Effect or Project Characteristic                                                     | Applicant Preferred (AP) Alternative – Above Star Bend (ASB) Setback Levee Alternative                                                                                                                                           | Intermediate Setback Levee (ISL) Alternative                                                                                                                                                    | Levee Strengthening (LS) Alternative                                                                                                                                                                                                                                      | No-Action Alternative                                                                                                         |
|----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| <b>Existing Characteristics of Flood Protected Area by Major Cover Type (approximate acreages)</b> | Orchard 5,110 ac<br>Rice 155 ac<br>Other Crops 1,290 ac<br>Fallow 1,855 ac<br>Other Ag. 40 ac<br>Residential 2,700 ac<br>Other Developed 335 ac<br>Natural Habitat 615 ac                                                        | Orchard 5,295 ac<br>Rice 155 ac<br>Other Crops 1,290 ac<br>Fallow 1,855 ac<br>Other Ag. 40 ac<br>Residential 2,705 ac<br>Other Developed 340 ac<br>Natural Habitat 620 ac                       | Orchard 6,210 ac<br>Rice 155 ac<br>Other Crops 1,290 ac<br>Fallow 1,905 ac<br>Other Ag. 40 ac<br>Residential 2,705 ac<br>Other Developed 350 ac<br>Natural Habitat 745 ac                                                                                                 | Cover types and acreages listed for the Levee Strengthening (LS) Alternative remain with less than 100-year flood protection. |
| <b>Assurance of Meeting Flood Control Objectives</b>                                               | High expectation that this alternative would meet flood control objectives with the greatest proportion of the alignment located on older, more consolidated soils (see Figure 3.2-1, “Geologic Formations in the Project Area”) | High expectation that this alternative would meet flood control objectives, although a lower proportion of the alignment would be situated on older, more consolidated soils compared to the AP | High expectation that this alternative would meet flood control objectives; however, historical underseepage and through-seepage issues along the existing levee make it unclear whether flood control objectives would be met in the long-term compared to the AP or ISL | Would not meet any of the flood control objectives                                                                            |

– = no effect

cu. yd. = cubic yards

ac = acres

<sup>1</sup> Based on data contained in the *Phase 4 Feather River Levee Repair Project Alternatives Analysis Report*. Prepared by Bookman-Edmonston/GEI Consultants for Three Rivers Levee Improvement Authority. December 2006. Oakland, CA.

<sup>2</sup> Construction costs only for Segment 2 work provided in 2006 dollars.

<sup>3</sup> Based on data provided by Bender Rosenthal, Inc., right-of-way and land acquisition agent for TRLIA.

<sup>4</sup> Approximate financing costs based on borrowing 25% of total project costs at 6% interest with 24-month payment period. Loans for past TRLIA projects have been paid in approximately 24-months.

<sup>5</sup> Total estimated costs include engineering, land acquisition, permitting, environmental mitigation, restoration, construction and construction management, and operations and maintenance.

<sup>6</sup> Estimated Operations and Maintenance (O&M) costs for new facilities based on current \$18,000 per mile/per year O&M budget data from RD 1000 compiled by MBK Engineers.

<sup>7</sup> Based on continuation of RD784's current average O&M outlay of \$8,447 per mile/per year.



## **ES.10.1 APPLICANT PREFERRED ALTERNATIVE – ASB SETBACK LEVEE ALTERNATIVE**

The Applicant Preferred Alternative – ASB Setback Levee Alternative consists of constructing and maintaining a new setback levee, removing all or portions of the existing levee, and related activities along the Feather River left bank levee from PLM 17.2 to PLM 23.4 (from approximately Star Bend upstream to near Shanghai Bend, southwest of the Yuba County Airport). This area is identified as Segment 2 of the FRLRP. The setback levee would be approximately 5.7 miles long. The new levee segment would generally be set back approximately 0.5 mile to the east of the existing Feather River levee, except near the northern and southern ends, where it would join the existing levee.

The location for the setback levee alignment was selected to maximize the placement of the levee on older more consolidated geologic formations (i.e., Modesto formation) while limiting the amount of land that would need to be placed in the expanded floodway. Therefore, much of the alignment is located near the western edge of the Modesto formation where it transitions from more porous Holocene age river channel deposits. Many of the underseepage issues that have plagued the existing Segment 2 levee can be attributed to the levee being constructed on Holocene age river channel deposits which consist of poorly consolidated sands, silts, clays, and gravels. During high-water events, water from the river can enter these pervious poorly consolidated foundations soils and then move laterally through these layers and under the levee. The older Pleistocene-age Modesto formation soils are more consolidated and more resistant to underseepage. Therefore, the Modesto formation soils provide superior conditions for a levee foundation. More than two thirds of the setback levee alignment under the Applicant Preferred Alternative – ASB Setback Levee Alternative is located on Modesto formation soils. Where the alignment crosses Holocene age river channel deposits, slurry cutoff walls and other engineering methods have been incorporated into the project design to correct for the more porous foundation soils.

The Applicant Preferred Alternative would be completed in two stages. Stage 1 of this alternative includes these activities: constructing the setback levee and associated stability berms; constructing slurry cutoff walls along substantial portions of the setback levee alignment; constructing a new Pump Station No. 3 and associated facilities, filling the Plumas Lake Canal on the water side from the setback levee to where the canal opens into the ponded area and on the land side from the setback levee to the new Pump Station No. 3; excavating material within borrow sites (within the setback area and on the land side of the setback levee); and removing, replacing, or relocating existing utilities and structures within the setback area. Stage 2 of the project includes these activities: degrading all or portions of the existing Feather River left bank levee within Segment 2; decommissioning of the existing Pump Station No. 3; and recontouring portions of the levee setback area and an existing drainage to facilitate drainage of water from the levee setback area after flood events.

TRLIA is also discussing the feasibility of active restoration in the setback area with the various landowners and stakeholders in the setback area and with the various regulatory agencies. If restoration were conducted, it would be part of Stage 2. Balanced with the potential for habitat restoration in the setback area is TRLIA's commitment to maintain as much of the setback area in agriculture as economically feasible, subject to ensuring public safety. The TRLIA board has adopted a resolution codifying this commitment to maintaining agricultural operations in the setback area, which is provided in Appendix C of this EIS. Based on the requirements of this resolution and existing information on agricultural operations in the setback area and anticipated construction disturbance, it is reasonable to assume that one half or more of the roughly 1,045 acres of agricultural lands in the setback area would be retained in agricultural operations. Under these circumstances, up to approximately 525 acres of agricultural land in the setback area would be taken out of agricultural production and converted to habitat (Table ES-2). Of the 525 acres, approximately 40 acres would be held under a permanent conservation easement for planting of elderberry shrubs (both relocated shrubs and seedlings) and associated riparian species to compensate for elderberry shrubs that would be moved out of the project construction area, in accordance with U.S. Fish and Wildlife Service (USFWS) requirements.

The intended outcome of the Applicant Preferred Alternative – ASB Setback Levee Alternative is to provide a setback levee in Segment 2 that meets the engineering and design standards of the CVFPB and the Corps as well

as FEMA geotechnical requirements for through-seepage and underseepage at the water surface elevation for the 200-year flood event.

## **ES.10.2 INTERMEDIATE SETBACK LEVEE ALTERNATIVE**

The Intermediate Setback Levee Alternative would involve the construction of a setback levee. This alternative would match the alignment of the Applicant Preferred Alternative – ASB Setback Levee Alternative for approximately 1.6 miles in the south, would then transition to an alignment approximately 1,000 feet (maximum) to the west of the Applicant Preferred Alternative’s setback levee alignment, then would match the Applicant Preferred Alternative’s alignment again at the northern tie-in to the existing levee. This setback levee, at approximately 5.5 miles long, would be roughly 0.2 mile shorter than the setback levee under the Applicant Preferred Alternative. Construction of the setback levee in the Intermediate Setback Levee Alternative would result in approximately 1,100 acres of existing land becoming part of the new Feather River floodway. The reason for proposing an intermediate setback levee is to reduce the adverse effects on existing land uses and the extent of acquisition of land rights necessary within the setback area. However, as a result of portions of the Intermediate Setback Levee alignment being placed farther to the west and closer to the Feather River, more of the alignment is placed on Holocene age river channel deposits than under the Applicant Preferred Alternative. As discussed above, more than two thirds of the setback levee alignment under the Applicant Preferred Alternative is placed on more consolidated and less porous Modesto formation soils, with the remainder placed on Holocene age river channel deposits which are more susceptible to underseepage. Where the alignment crosses Holocene age river channel deposits, slurry cutoff walls and other engineering methods have been incorporated into the project design to correct for the more porous foundation soils. For the Intermediate Setback Levee Alternative, approximately half of the alignment is placed on Modesto formation soils with the remainder placed on younger Holocene age river channel deposits.

The plan for construction of the Intermediate Setback Levee Alternative would generally be the same as described above for the Applicant Preferred Alternative. Although locations of some project elements would differ, methods of constructing the slurry cutoff wall, foundation preparation, levee embankment construction, utility relocation, removal of the existing levee, relocation of Pump Station No. 3, and other construction elements would be the same.

## **ES.10.3 LEVEE STRENGTHENING ALTERNATIVE**

This alternative would involve repairs and improvements to the existing Feather River levee along Segment 2. No setback levee would be constructed. Repairs and improvements would consist of constructing slurry walls, installing relief wells, raising and/or constructing seepage/stability berms at various locations, and correcting identified waterside erosion problem areas. Under this alternative, the existing Pump Station No. 3 would be removed and a new pump station would be installed farther east of the existing site. Most of the proposed repairs and improvements under the Levee Strengthening Alternative are required to correct for the existing levee alignment being located entirely on relatively porous Holocene age river channel deposits. Many of the underseepage issues that have plagued the existing Segment 2 levee can be attributed to the levee being constructed on Holocene age river channel deposits consisting of poorly consolidated sands, silts, clays, and gravels. During high-water events, water from the river can enter these pervious poorly consolidated foundations soils and then move laterally through these layers and under the levee. These conditions have resulted in the levee foundation experiencing chronic underseepage problems. To support construction of needed seepage/stability berms and other repair activities, soil borrow areas would be established of sufficient size to provide needed borrow material.

## **ES.10.4 No-ACTION ALTERNATIVE**

For the purposes of compliance with NEPA, the No-Action Alternative serves as the baseline against which the impacts and benefits of the action alternatives are evaluated. The No-Action Alternative in this analysis consists

of the conditions that would likely prevail along Segment 2 of the Feather River levee if no action was taken by TRLIA, the State, or the Corps to repair this deficient levee segment requiring Section 408 authorization [33 USC 408] for alteration of a federal project levee, NEPA approval, or an individual permit under Section 404 of the federal Clean Water Act (CWA) (33 USC 1344) for dredge or fill of waters of the U.S. Minor levee repairs not meeting these criteria, for example, correction of erosion sites that might be authorized under CWA Nationwide Permit (NWP) #3, could be implemented. The Feather River left bank levee in Segment 2 would remain in its current condition other than potential implementation of relatively minor repairs. Significant deficiencies, including underseepage potential and through-seepage potential identified in Segment 2 would remain unaddressed. The current levee inspection and maintenance program implemented by RD 784 would continue. Pump Station No. 3 would remain in its current condition at its current location. A substantial risk of levee failure and flooding in the approximately 13,400 acre portion of the RD 784 area protected by the Segment 2 levee (Figure ES-1) would remain as a result of the previously identified deficiencies. This scenario is consistent with the Yuba Basin GRR Future No-Action Condition.

## **ES.11 RESULTS OF SCOPING AND PUBLIC INVOLVEMENT**

### **ES.11.1 COOPERATING AGENCIES**

Given constraints associated with project implementation, no federal agencies were invited to serve as a cooperating agency. However, all federal agencies with decision-making interests were contacted through public scoping and/or consultations. (See also Chapter 6, “Consultation and Coordination.”)

### **ES.11.2 PUBLIC SCOPING MEETING**

On March 6, 2008, a notice was distributed by the Corps to a mailing list announcing the public scoping meeting and soliciting input from public and private landowners in the project area on the scope and content of the DEIS. A notice of intent (NOI) to prepare an EIS was published in the Federal Register on February 29, 2008. Notice of the meeting was published in the Sacramento Bee on March 9, 2008.

The public scoping meeting was held in Marysville on March 10, 2008. The Corps planned the meeting to brief interested parties on the Segment 2 project, and obtain the views of local residents and other interested attendees on the scope and content of the DEIS. Representatives from the Corps, TRLIA, and consultants to the Corps were available to answer questions and discuss aspects of the project. Attendees were provided the opportunity at the public meeting to submit comments on the content and scope of the DEIS. Details were given on how to submit comments to the Corps after the meeting. Scoping meeting materials and comments submitted by the one special interest group that provided comments are included in an Appendix K of this FEIS.

### **ES.11.3 AREAS OF CONTROVERSY**

A major area of controversy associated with Segment 2 of the FRLRP has been the purchase of private land or easements on private land for project implementation, and the permanent removal of Important Farmland from agricultural use (approximately 290 acres for the Applicant Preferred Alternative – ASB Setback Levee Alternative and approximately 270 acres for the Intermediate Setback Levee Alternative). However, continued farming operations are expected to be feasible in many parts of the levee setback areas under either of the two setback levee alternatives. The Levee Strengthening Alternative would result in a permanent conversion of approximately 30 acres of Important Farmland. Refer to Section 3.1, “Land Use and Agriculture,” for an analysis of this issue.

Although only limited plans for habitat restoration in the setback area are proposed at this time (approximately 60 total acres), future management plans for other portions of the levee setback areas under either of the setback levee alternatives could include restoration of habitat and wetland areas as a substitute for agricultural uses where

opportunities are present. Converting agricultural land to riparian and wildlife habitat is controversial in some agricultural communities in the Sacramento Valley. Refer to Section 3.6, “Waters of the United States and Wetlands,” and Section 3.9, “Special-Status Biological Resources,” for a discussion of how the Applicant Preferred Alternative would provide areas of enhanced habitat conditions in the setback area.

This project would help resolve a current area of known and long-standing controversy, namely, the existing risk of flooding impacts in the RD 784 area. Overall, repairs to Segment 2 of the FRLRP would reduce the ongoing concern and controversy over flood protection in local communities. Any continuing controversy would be related primarily to the potential of the project to induce growth leading to changes in land use patterns and population densities and related impacts on environmental resources. Plans for development of land in the RD 784 area were adopted by Yuba County with the assumption that the area would be adequately protected from future flood events but before various studies and investigations identified levee instability issues that would subject these new communities to the risk of flooding. Refer to Chapter 4.0, “Cumulative and Growth-Inducing Effects,” for an analysis of environmental effects associated with development in the floodplain.

The Feather River levee in the study area for Segment 2 of the FRLRP is part of the SRFCP. Suggestions that the project has been designed and evaluated as if it were only a local flood control project separate from the larger SRFCP has been a subject of controversy. However, federal and state agencies with direct roles in permitting the project continue to be involved in review and approval of application materials. In particular, the CVFPB enforces standards for flood control facilities in the Central Valley. DWR oversees levee operation and maintenance. Project levees in California must meet standards for levee design and construction specified by the Corps in Engineer Manual 1110-2-1913 and in the 23 California Code of Regulations (CCR) Section 120. The entire FRLRP, including the Segment 2 project, has been designed to be in compliance with all applicable standards, programs, and practices of agencies with responsibilities related to the SRFCP. Also, approval of the new setback levee construction by engineers from the CVFPB and the Corps will be necessary before permission is granted to proceed with work to degrade the existing levee in Segment 2. Refer to Chapter 1.0, “Purpose of and Need for Action,” for a discussion of the relationship of the Applicant Preferred Alternative and other action alternatives to the Corps Yuba Basin General Re-Evaluation Report. Refer to Chapter 2.0, “Alternatives,” for a general discussion of the design standards for the Applicant Preferred Alternative and other alternatives, which are subject to review and approval by the CVFPB and the Corps. Refer also to Section 3.3, “Surface and Groundwater Hydrology and Geomorphology,” for an analysis of the hydraulic effects of the Applicant Preferred Alternative and other alternatives.

Based on documented evidence of boils and underseepage along the FRLRP levees and the urgency of implementing repairs to these levees, work commenced in 2007 on the fully permitted Segments 1 and 3 of the FRLRP. Related work on Segment 2, the middle segment of the FRLRP, began in summer 2008. Environmental review under NEPA for the Segment 2 project is underway. Coordination with state and federal permitting agencies is documented in the permitting materials contained in the appendices to this EIS. Although the initiation of construction by TRLIA in portions of the Segment 2 area not requiring federal authorization prior to completion of the NEPA process has been identified as a subject of controversy, no construction would be undertaken that is not in full compliance with applicable laws and regulations. Refer to Chapter 2.0, “Alternatives,” for a discussion of construction scheduling.

## **ES.11.4 ISSUES TO BE RESOLVED**

The Corps will need to determine whether to grant permission for the project pursuant to Section 408 of the Rivers and Harbors Act of 1899 (33 USC 408) and Section 404 of the Federal Clean Water Act (CWA)(33 USC 1344). Section 404 application materials for the Segment 2 project were submitted to the Corps in 2007 (see Appendix B). Consultation under Section 7 of the federal Endangered Species Act (ESA) as well as Section 106 of the National Historic Preservation Act (NHPA) are required components of the Section 404 permit action.

Formal consultation between the Corps, the U.S. Fish and Wildlife Service (USFWS), and the National Marine Fisheries Service (NMFS) was initiated in November 2007. In December 2007, NMFS provided a letter to the Corps determining that the Applicant Preferred Alternative is not likely to adversely affect species under its jurisdiction that might occur in the project area. NMFS also concluded that the Applicant Preferred Alternative would not adversely affect Essential Fish Habitat for Pacific salmon. Receipt of this letter concluded consultation for the Applicant Preferred Alternative (Appendix H). On August 28, 2008, USFWS issued the final biological opinion (BO) addressing the potential effects of the Applicant Preferred Alternative on federally threatened species under their jurisdiction, thereby completing Section 7 consultation between the Corps and USFWS (Appendix H). With issuance of the final BO, no unresolved issues remain related to Section 7 consultation.

The Corps initiated Section 106 consultation with the State Historic Preservation Officer (SHPO) in February 2008. A Memorandum of Agreement (MOA) between the Corps, TRLIA, and the SHPO was prepared to address protection of cultural resources at the Segment 2 project site. In June 2008, the Corps sent the draft MOA to the Enterprise Rancheria and the Advisory Council on Historic Preservation (ACHP) for review and comment. The ACHP subsequently declined to participate in consultation (i.e., no objections were specified in correspondence sent to the Corps), and no response was received from the Enterprise Rancheria on the draft MOA. With execution of the MOA on July 22, 2008, Section 106 consultation for the project is completed. Additional documents related to protection of cultural resources have been prepared and submitted to the Corps, SHPO, and Enterprise Rancheria in accordance with the terms specified in the MOA. At the time this FEIS was prepared, no comments had been received requiring changes to the MOA or related documents, and no known unresolved issues remain related to Section 106 consultation.

Land uses in the levee setback area under either alternative involving construction of a setback levee would consist of continued agricultural operations and restoration of habitat and wetland areas. The TRLIA board has adopted a policy to maintain as much of the setback area in agricultural use as is economically feasible and subject to ensuring public safety (see the discussion in Section 3.1, “Land Use and Agriculture”). Special operations and maintenance plans would need to be prepared and implemented to ensure the long-term maintenance of any agricultural and/or habitat areas, and to ensure that such areas would not conflict with the flood control function of the levee setback area. This work would require consultation with affected landowners, resource agencies, and other stakeholders.

## **ES.12 INTENDED USES OF THE EIS**

The July 2008 DEIS and this FEIS together will facilitate planning and regulatory activities by the Corps in connection with Segment 2 of the FRLRP. The entire EIS will be used by the Corps in exercising its decision-making authority under Section 404 of the CWA and Section 408 of the Rivers and Harbors Act of 1899.

## **ES.13 ENVIRONMENTAL EFFECTS AND MITIGATION**

The direct environmental effects of the Applicant Preferred Alternative – ASB Setback Levee Alternative and other action alternatives, and mitigation measures to reduce those effects, are summarized in Table ES-3. This table summarizes information from Chapter 3 of this FEIS. Indirect effects, such as the potential for provision of increased flood protection to remove an obstacle to growth and the potential for that growth to result in conversion of agricultural land to development, are summarized above in Table ES-2. Numbering of impacts and mitigation measures in Table ES-3 corresponds to the numbering in Chapter 3 of this FEIS to allow the reader to easily find the complete text of the impact discussion or mitigation measure if desired.

The No-Action Alternative is not addressed in Table ES-3 because numbered impacts and mitigation measures are not provided for this alternative in Chapter 3.0 of this FEIS. Potential environmental effects of the No-Action Alternative are described in narrative terms. These effects are summarized below. The No-Action Alternative would result in several significant adverse effects, since a substantial risk of levee failure and flooding of the RD 784 area would remain as a result of the identified levee deficiencies. This potential was evidenced by the

reactivation, by a moderate high-water event in early January 2006, of historical boils along the Segment 2 levee that had been believed to be permanently repaired by construction measures undertaken by the Corps in 1997 following the 1997 Feather River levee break.

In the event of a levee failure in the FRLRP Segment 2 area during a 1-in-100 AEP event, approximately 13,400 acres within the RD 784 area could be inundated; the extent of flooding would depend on the location of the break and hydrologic conditions. (Refer to Chapter 4.0, “Cumulative and Growth-Inducing Effects,” for a discussion of the inundation area.) Approximately 7,640 acres within the inundation area are in agricultural uses, including cultivated cropland, grazing land, and accessory uses. Of that total, approximately 7,325 acres are categorized as Important Farmland based on data maintained by the California Department of Conservation. No data exist to quantify the social impacts related to a future catastrophic flood event in the RD 784 area similar in extent to the one that occurred in 1997. It is estimated that 800 homes and businesses were damaged or destroyed as a result of the 1997 flood. Since then, approximately 3,200 homes have been constructed in the Plumas Lake Specific Plan area. A future comparable flood event would result in dislocation of residents, property loss, loss of farm jobs and farm dependent jobs, and community fragmentation. Businesses in the region would be affected by the loss of jobs and income for local residents. Increased housing demand could exceed the supply in areas beyond the inundation area. Increased demand for social services from dislocated residents could strain the ability of local and regional service providers to serve those in need.

With the No-Action Alternative, significant adverse effects were identified for many resources:

- ▶ damage to Important Farmland,
- ▶ damage to local soils from scoring and erosion,
- ▶ sedimentation of landside drainages,
- ▶ contamination of area waterways from accidental release of hazardous materials,
- ▶ exposure of persons and property to hazardous materials,
- ▶ disturbance or fill of waters of the U.S. resulting from cleanup activities following a levee breach,
- ▶ impacts to special-status species such as the giant garter snake due to inundation of habitat,
- ▶ damage to or destruction of previously undiscovered cultural resource deposits,
- ▶ impacts to air quality due to the need for wide spread levee repairs,
- ▶ substantial increase in ambient noise levels from operation of heavy equipment during cleanup work following a levee failure,
- ▶ traffic hazards due to flooding of roadways and road closures,
- ▶ widespread damage to public infrastructure and utilities in the area of inundation, and,
- ▶ increases in emergency response times.

Each of the three action alternatives would exceed the Feather River Air Quality Management District’s (FRAQMD’s) thresholds for daily emissions (although numerous emission reduction mitigation measures required by FRAQMD would be implemented), resulting in a significant unavoidable air quality impact. However, none of these three alternatives would exceed federal general conformity thresholds in any construction year. For all other environmental issue areas, the Applicant Preferred Alternative – ASB Setback Levee

Alternative and the Intermediate Setback Levee Alternative would have similar environmental effects, with the Applicant Preferred Alternative – ASB Setback Levee Alternative affecting more Important Farmland, but the Intermediate Setback Levee Alternative providing lesser beneficial effects related to regional reductions in flood hazards and habitat improvements for wildlife and fisheries.

**Table ES-3**  
**Summary of Direct Impacts of Action Alternatives and Mitigation Measures**

| Resource Topic/Impact                                                                                                                                           | Alternative | Duration of Impact                                                                                        | Quantification of Impact                     | Relationship Between Impacts                                                                     | Level of Significance before Mitigation | Mitigation Measure                                                                                                                                                                                                                                                                      | Level of Significance after Mitigation |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-----------------------------------------------------------------------------------------------------------|----------------------------------------------|--------------------------------------------------------------------------------------------------|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| <b>3.1 Land Use and Agriculture</b>                                                                                                                             |             |                                                                                                           |                                              |                                                                                                  |                                         |                                                                                                                                                                                                                                                                                         |                                        |
| Impact 3.1-a: Convert Important Farmland to Nonagricultural Uses                                                                                                | AP, ISL, LS | Permanent                                                                                                 | AP:290 acres<br>ISL:270 acres<br>LS:30 acres | Potential effects on minority or low-income populations less than significant; see Impact 3.16-a | Less than significant                   | Mitigation Measure 3.1-a1: Minimize Disturbance of Important Farmland and Continuing Agricultural Operations.<br><br>Mitigation measure ensures impact quantities do not exceed those described in impact discussion.                                                                   | Less than significant                  |
|                                                                                                                                                                 | AP, ISL     | Permanent                                                                                                 | Included above                               | None                                                                                             | Less than significant                   | Mitigation Measure 3.1-a2: Ensure Access to Setback Properties, Salvage Topsoil, and Relocate Utilities.<br><br>Mitigation measure does not change quantities of agricultural land conversion, but retains access to existing agricultural lands and benefits other agricultural lands. | Less than significant                  |
| Impact 3.1-b: Potential Conflict with Local Land Use Designations                                                                                               | AP, ISL     | None                                                                                                      | Negligible                                   | None                                                                                             | Less than significant                   | No mitigation required                                                                                                                                                                                                                                                                  | Less than significant                  |
|                                                                                                                                                                 | LS          | None                                                                                                      | None                                         | None                                                                                             | No impact                               | No mitigation required                                                                                                                                                                                                                                                                  | Not applicable                         |
| <b>3.2 Geology and Soils</b>                                                                                                                                    |             |                                                                                                           |                                              |                                                                                                  |                                         |                                                                                                                                                                                                                                                                                         |                                        |
| Impact 3.2-a: Exposure of Persons or Property to Geologic Hazards, such as Ground Shaking, Liquefaction, Landslides, Land Subsidence, or Erosion; Location on a | AP, ISL, LS | Temporary at undetermined intervals, with AP providing the greatest improvement from existing conditions, | Negligible                                   | None                                                                                             | Less than significant                   | No mitigation required                                                                                                                                                                                                                                                                  | Less than significant                  |

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**Table ES-3**  
**Summary of Direct Impacts of Action Alternatives and Mitigation Measures**

| Resource Topic/Impact                                                                                                                                             | Alternative | Duration of Impact                                                       | Quantification of Impact | Relationship Between Impacts                                                                                                                                                          | Level of Significance before Mitigation | Mitigation Measure     | Level of Significance after Mitigation |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------------------------------------------------------------------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|------------------------|----------------------------------------|
| Geologic Unit or Soil That is Unstable or That Would Become Unstable as a Result of the Project                                                                   |             | ISL providing moderate improvement, and LS providing minimal improvement |                          |                                                                                                                                                                                       |                                         |                        |                                        |
| <b>3.3 Surface and Groundwater Hydrology and Geomorphology</b>                                                                                                    |             |                                                                          |                          |                                                                                                                                                                                       |                                         |                        |                                        |
| Impact 3.3-a: Alter Regional or Local Hydrology, Result in Erosion of the Levee System, or Substantially Increase the Mobilization and/or Deposition of Sediments | AP, ISL     | Permanent                                                                | Negligible               | Minor increased potential for sediment mobilization could contribute slightly to Impacts 3.4-b and 3.8-a. All impacts remain less than significant either before or after mitigation. | Less than significant                   | No mitigation required | Less than significant                  |
|                                                                                                                                                                   | LS          | None                                                                     | None                     | None                                                                                                                                                                                  | No impact                               | No mitigation required | Not applicable                         |
| Impact 3.3-b: Substantially Affect Groundwater Resources or Substantially Reduce Water Supply                                                                     | AP, ISL, LS | Permanent                                                                | Negligible               | None                                                                                                                                                                                  | Less than significant                   | No mitigation required | Less than significant                  |
| Impact 3.3-c: Substantially Alter the Existing Drainage Pattern of the Site or Area                                                                               | AP, ISL     | Permanent                                                                | Negligible               | None                                                                                                                                                                                  | Less than significant                   | No mitigation required | Less than significant                  |
|                                                                                                                                                                   | LS          | None                                                                     | None                     | None                                                                                                                                                                                  | No impact                               | No mitigation required | Not applicable                         |

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| <b>Table ES-3</b><br><b>Summary of Direct Impacts of Action Alternatives and Mitigation Measures</b>                                                           |             |                                  |                                                              |                                                                                                                     |                                         |                                                                                                                                                                                                           |                                        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------------------|--------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| Resource Topic/Impact                                                                                                                                          | Alternative | Duration of Impact               | Quantification of Impact                                     | Relationship Between Impacts                                                                                        | Level of Significance before Mitigation | Mitigation Measure                                                                                                                                                                                        | Level of Significance after Mitigation |
| <b>3.4 Water Quality</b>                                                                                                                                       |             |                                  |                                                              |                                                                                                                     |                                         |                                                                                                                                                                                                           |                                        |
| Impact 3.4-a: Violate Any Water Quality Standards or Waste Discharge Requirements or Otherwise Substantially Degrade Water Quality during Project Construction | AP, ISL, LS | Temporary                        | Negligible                                                   | Potential effects on special-status fish species less than significant with mitigation; see Impacts 3.8-a and 3.8-c | Potentially significant                 | Mitigation Measure 3.4-a: Prepare and Implement a Stormwater Pollution Prevention Plan                                                                                                                    | Less than significant                  |
| Impact 3.4-b: Violate Any Water Quality Standards or Waste Discharge Requirements or Otherwise Substantially Degrade Water Quality during Project Operation    | AP, ISL     | Permanent                        | Specific to future disturbances                              | See relationship to Impact 3.3-a above.                                                                             | Potentially significant                 | Mitigation Measure 3.4-b: Comply with Regional Water Quality Control Board Irrigated Lands Requirement                                                                                                    | Less than significant                  |
|                                                                                                                                                                | LS          | None                             | None                                                         | None                                                                                                                | No impact                               | No mitigation required                                                                                                                                                                                    | Not applicable                         |
| <b>3.5 Hazardous Materials</b>                                                                                                                                 |             |                                  |                                                              |                                                                                                                     |                                         |                                                                                                                                                                                                           |                                        |
| Impact 3.5-a: Create a Significant Hazard to the Public or the Environment Through Release of Hazardous Materials into the Environment                         | AP, ISL     | Temporary, duration undetermined | Specific to future disturbances, total impact unquantifiable | Potential effects on water quality (and hence, aquatic organisms) less than significant with mitigation             | Potentially significant                 | Mitigation Measure 3.5-a1: Evaluation of Soils, Identification of Hazardous Materials, Disposition of Topsoil<br>Mitigation Measure 3.5-a2: Implement Recommendations from the Phase I and Phase II ESAs. | Less than significant                  |
|                                                                                                                                                                | LS          | None                             | None                                                         | None                                                                                                                | No impact                               | No mitigation required                                                                                                                                                                                    | Not applicable                         |
| <b>3.6 Waters of the United States and Wetlands</b>                                                                                                            |             |                                  |                                                              |                                                                                                                     |                                         |                                                                                                                                                                                                           |                                        |
| Impact 3.6-a: Adverse Effect on Federally Protected Waters of the United States, Including Wetlands, as                                                        | AP, ISL     | Permanent to specific location   | 6.7 acres permanent removal                                  | Habitats affected also support giant garter snake and                                                               | Significant                             | Mitigation Measure 3.6-a: Complete Section 404 Permit Process and Mitigate for Wetland Acreage Affected on a “No Net                                                                                      | Less than significant                  |

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**Table ES-3**  
**Summary of Direct Impacts of Action Alternatives and Mitigation Measures**

| Resource Topic/Impact                                            | Alternative | Duration of Impact             | Quantification of Impact                                                                | Relationship Between Impacts                                                                                                                                                                               | Level of Significance before Mitigation | Mitigation Measure                                                                                                                                                                                                                                                                                                                                                         | Level of Significance after Mitigation |
|------------------------------------------------------------------|-------------|--------------------------------|-----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| Defined by Section 404 of the CWA                                | LS          | Permanent to specific location | 4.0 acres disturbance and removal                                                       | Valley elderberry longhorn beetle. Relationship to Impact 3.7-a below.<br><br>Habitats affected also support giant garter snake and Valley elderberry longhorn beetle. Relationship to Impact 3.7-a below. | Significant                             | Loss” Basis<br>Functions and values of 6.7 acres permanently removed habitat is fully replaced.<br><br>Mitigation Measure 3.6-a: Complete Section 404 Permit Process and Mitigate for Wetland Acreage Affected on a “No Net Loss” Basis<br><br>Functions and values of 4.0 acres disturbed/removed habitat is fully replaced.                                              | Less than significant                  |
| <b>3.7 Terrestrial Biological Resources</b>                      |             |                                |                                                                                         |                                                                                                                                                                                                            |                                         |                                                                                                                                                                                                                                                                                                                                                                            |                                        |
| Impact 3.7-a: Adverse Effects on Special-Status Wildlife Species | AP, ISL, LS | Permanent                      | Specific to species addressed and alternative. See Table 3.7-3 in body of the document. | Giant garter snake and Valley elderberry longhorn beetle utilize jurisdictional/ wetland habitats. See Impact 3.6-a above.                                                                                 | Significant                             | Mitigation Measure 3.7-a1: Minimize Adverse Effects on Valley Elderberry Longhorn Beetle<br><br>Mitigation Measure 3.7-a2: Minimize Adverse Effects on Northwestern Pond Turtle<br><br>Mitigation Measure 3.7-a3: Minimize Adverse Effects on Giant Garter Snake<br><br>After mitigation overall habitat functions and values either meet or exceed pre-project conditions | Less than significant                  |

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| <b>Table ES-3</b><br><b>Summary of Direct Impacts of Action Alternatives and Mitigation Measures</b>                                    |             |                    |                                                              |                                                                                                                                                                                                  |                                         |                                                                                                                                                                                                                                                                  |                                        |
|-----------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------------|--------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| Resource Topic/Impact                                                                                                                   | Alternative | Duration of Impact | Quantification of Impact                                     | Relationship Between Impacts                                                                                                                                                                     | Level of Significance before Mitigation | Mitigation Measure                                                                                                                                                                                                                                               | Level of Significance after Mitigation |
| Impact 3.7-b: Adverse Effects on Nesting Raptors and Other Nesting Migratory Bird Species Protected Under the Migratory Bird Treaty Act | AP, ISL, LS | Temporary          | Specific to future disturbances, total impact unquantifiable | None                                                                                                                                                                                             | Potentially significant                 | Mitigation Measure 3.7-b: Conduct Preconstruction Surveys and Protect Active Nests to Minimize Effects on Nesting Raptors                                                                                                                                        | Less than significant                  |
| <b>3.8 Fisheries</b>                                                                                                                    |             |                    |                                                              |                                                                                                                                                                                                  |                                         |                                                                                                                                                                                                                                                                  |                                        |
| Impact 3.8-a: Potential Adverse Water Quality Effects on Special-Status Fish Species                                                    | AP, ISL, LS | Temporary          | Specific to future disturbances, total impact unquantifiable | Water quality effects associated with Impacts 3.3-a, 3.4-a, and 3.5-a, listed above could contribute to this impact. All impacts remain less than significant either before or after mitigation. | Significant                             | Mitigation Measure 3.8-a1: Implement Mitigation Measure 3.4-a, Prepare and Implement a Stormwater Pollution Prevention Plan<br><br>Mitigation Measure 3.8-a2: Implement Mitigation Measure 3.5-a1, Evaluation of Soils and Identification of Hazardous Materials | Less than significant                  |
| Impact 3.8-b: Substantially Reduce the Quality and Quantity of Important Habitat for Special-Status Fish Species                        | AP, ISL, LS | Permanent          | Negligible                                                   | Relates to loss of riparian vegetation included in Impact 3.6-a.                                                                                                                                 | Less than significant                   | No mitigation required                                                                                                                                                                                                                                           | Less than significant                  |

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**Table ES-3**  
**Summary of Direct Impacts of Action Alternatives and Mitigation Measures**

| Resource Topic/Impact                                                                                                                                                                                                                                                                         | Alternative | Duration of Impact | Quantification of Impact                                     | Relationship Between Impacts | Level of Significance before Mitigation | Mitigation Measure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Level of Significance after Mitigation |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------------|--------------------------------------------------------------|------------------------------|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| Impact 3.8-c: Substantially Reduce Special-Status Fish Populations                                                                                                                                                                                                                            | AP, ISL     | Permanent          | Specific to future disturbances, total impact unquantifiable | None                         | Significant                             | Mitigation Measure 3.8-c1: Comply with Conditions of Streambed Alteration Agreement<br>Mitigation Measure 3.8-c2: Comply with Conditions Set Forth in the Biological Assessments (BAs) Prepared for USFWS and NMFS and the USFWS Biological Opinion (BO) as Part of the ESA Section 7 Consultation Process                                                                                                                                                                                                   | Less than significant                  |
|                                                                                                                                                                                                                                                                                               | LS          | None               | None                                                         | None                         | No impact                               | No mitigation required                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Not applicable                         |
| <b>3.9 Special-Status Biological Resources</b>                                                                                                                                                                                                                                                |             |                    |                                                              |                              |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                        |
| Section 3.9 compiles special-status species information already provided in Sections 3.7, “Terrestrial Biological Resources”, and 3.8, “Fisheries” into a single section. No new information is provided in Section 3.9. See analysis of Sections 3.7 and 3.8 above for relevant information. |             |                    |                                                              |                              |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                        |
| <b>3.10 Cultural Resources</b>                                                                                                                                                                                                                                                                |             |                    |                                                              |                              |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                        |
| Impact 3.10-a: Adverse Changes in the Significance of a Historical Resource or an Archaeological Resource                                                                                                                                                                                     | AP, ISL     | Permanent          | Specific to future disturbances, total impact unquantifiable | None                         | Potentially significant                 | Mitigation Measure 3.10-a1: Prepare a Memorandum of Agreement (MOA) between the Corps, TRLIA and the SHPO, and Implement Measures in the Attached Historic Property Treatment Plan (HPTP) to Protect Site CA-Yub-5 during Project Construction. Conduct archaeological and geomorphic investigations to determine if deposits at CA-Yub-5 will be adversely affected by increased erosional effects and/or effects caused by future inundation. Take measures to protect site from future inundation through | Less than significant                  |

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| <b>Table ES-3</b><br><b>Summary of Direct Impacts of Action Alternatives and Mitigation Measures</b>           |             |                    |                                                              |                              |                                                                                                |                                                                                                                                                                                                                                                                                                                                           |                                        |
|----------------------------------------------------------------------------------------------------------------|-------------|--------------------|--------------------------------------------------------------|------------------------------|------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| Resource Topic/Impact                                                                                          | Alternative | Duration of Impact | Quantification of Impact                                     | Relationship Between Impacts | Level of Significance before Mitigation                                                        | Mitigation Measure                                                                                                                                                                                                                                                                                                                        | Level of Significance after Mitigation |
|                                                                                                                | LS          | None               | Negligible                                                   | None                         | Less than significant                                                                          | installation of rip-rap or vegetation planting. Perform data recovery if it is determined that archaeological deposits will be adversely affected by inundation.<br>Mitigation Measure 3.10-a2: Complete Surveys of the Area of Potential Effect<br>Mitigation Measure 3.10-a3: Provide Construction Monitoring<br>No mitigation required | Less than significant                  |
| Impact 3.10-b: Disturbance of Previously Unidentified Historical and Archaeological Resources or Human Remains | AP, ISL, LS | Permanent          | Specific to future disturbances, total impact unquantifiable | None                         | Potentially significant                                                                        | Mitigation Measure 3.10-b1: In the Event of Unanticipated Finds, Halt Construction and Notify the Proper Authorities<br>Mitigation Measure 3.10-b2: Provide Training to Construction Personnel in Identification of Cultural Deposits and Human Remains.                                                                                  | Less than significant                  |
| <b>3.11 Air Quality</b>                                                                                        |             |                    |                                                              |                              |                                                                                                |                                                                                                                                                                                                                                                                                                                                           |                                        |
| Impact 3.11-a: Air Quality Effects of Project Construction Emissions                                           | AP, ISL, LS | Temporary          | Above FRAQMD thresholds                                      | None                         | Significant (based on Feather River Air Quality Management District daily emission thresholds) | Mitigation Measure 3.11-a: Implement FRAQMD Measures for Reducing Short-term Air Quality Impacts; Comply with FRAQMD Rules and Regulations<br>Mitigation achieves construction equipment emission reductions of 5% for ROG, 20% for NO <sub>x</sub> , and 45% for PM <sub>10</sub> , and a 75% reduction in fugitive dust emissions.      | Significant and unavoidable            |

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**Table ES-3**  
**Summary of Direct Impacts of Action Alternatives and Mitigation Measures**

| Resource Topic/Impact                                                                                                                                            | Alternative | Duration of Impact | Quantification of Impact                                     | Relationship Between Impacts                                                                           | Level of Significance before Mitigation | Mitigation Measure                                                                            | Level of Significance after Mitigation |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------------|--------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|-----------------------------------------|-----------------------------------------------------------------------------------------------|----------------------------------------|
| FRAQMD daily emissions thresholds still exceeded after mitigation for all action alternatives.                                                                   |             |                    |                                                              |                                                                                                        |                                         |                                                                                               |                                        |
| <b>3.12 Noise and Vibration</b>                                                                                                                                  |             |                    |                                                              |                                                                                                        |                                         |                                                                                               |                                        |
| Impact 3.12-a: Substantial Increase in Noise Levels Above Ambient Levels for Sensitive Receptors                                                                 | AP, ISL, LS | Temporary          | Specific to future disturbances, total impact unquantifiable | None                                                                                                   | Potentially significant                 | Mitigation Measure 3.12-a: Implement Noise Control Measures                                   | Less than significant                  |
| Impact 3.12-b: Noise in Excess of Local Noise Regulations                                                                                                        | AP, ISL, LS | Temporary          | Negligible                                                   | None                                                                                                   | Less than significant                   | No mitigation required                                                                        | Less than significant                  |
| Impact 3.12-c: Excessive Construction-Generated Vibration Levels                                                                                                 | AP, ISL, LS | Temporary          | Negligible                                                   | None                                                                                                   | Less than significant                   | No mitigation required                                                                        | Less than significant                  |
| <b>3.13 Transportation and Circulation</b>                                                                                                                       |             |                    |                                                              |                                                                                                        |                                         |                                                                                               |                                        |
| Impact 3.13-a: An Increase in Truck Traffic and Passenger Vehicles, or an Equivalent Combination of Vehicles Per Hour in Excess of the ITE Recommended Threshold | AP, ISL, LS | Temporary          | Negligible                                                   | None                                                                                                   | Less than significant                   | No mitigation required                                                                        | Less than significant                  |
| Impact 3.13-b: Substantial Increase in Traffic Hazards on a Local Roadway                                                                                        | AP, ISL, LS | Temporary          | Specific to future disturbances, total impact unquantifiable | Potential effects on emergency response times less than significant with mitigation; see Impact 3.14-b | Significant                             | Mitigation Measure 3.13-b: Implement Measures to Reduce Hazards to Vehicles on Local Roadways | Less than significant                  |

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| <b>Table ES-3</b><br><b>Summary of Direct Impacts of Action Alternatives and Mitigation Measures</b>                                                                                                                                            |             |                    |                                                              |                                                    |                                         |                                                                                                                                                                                   |                                        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------------|--------------------------------------------------------------|----------------------------------------------------|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| Resource Topic/Impact                                                                                                                                                                                                                           | Alternative | Duration of Impact | Quantification of Impact                                     | Relationship Between Impacts                       | Level of Significance before Mitigation | Mitigation Measure                                                                                                                                                                | Level of Significance after Mitigation |
| <b>3.14 Public Services, Utilities, and Service Systems</b>                                                                                                                                                                                     |             |                    |                                                              |                                                    |                                         |                                                                                                                                                                                   |                                        |
| Impact 3.14-a: Increase in Risk of Structural Failure of, or Substantial Interference with Service from Existing Gas Facilities and Pipelines, Electrical Transmission or Distribution Lines, Telephone Lines, or Water Distribution Facilities | AP, ISL     | Temporary          | Specific to future disturbances, total impact unquantifiable | None                                               | Significant                             | Mitigation Measure 3.14-a: Implement Measures to Ensure That Levee Setback Construction Does Not Adversely Affect Public Utility Infrastructure or Result in Service Interruption | Less than significant                  |
|                                                                                                                                                                                                                                                 | LS          | Temporary          | Specific to future disturbances, total impact unquantifiable | None                                               | Less than significant                   | No mitigation required                                                                                                                                                            | Less than significant                  |
| Impact 3.14-b: Increase in Response Time for Emergency Service Providers                                                                                                                                                                        | AP, ISL, LS | Temporary          | Specific to future disturbances, total impact unquantifiable | Impact interacts with Traffic Impact 3.13-b above. | Significant                             | Mitigation Measure 3.14-b: Implement Measures to Reduce Hazards to Vehicles on Local Roadways                                                                                     | Less than significant                  |
| <b>3.15 Paleontological Resources</b>                                                                                                                                                                                                           |             |                    |                                                              |                                                    |                                         |                                                                                                                                                                                   |                                        |
| Impact 3.15-a: Potential to Directly or Indirectly Destroy a Unique Paleontological Resource or Site                                                                                                                                            | AP, ISL, LS | Permanent          | Specific to future disturbances, total impact unquantifiable | None                                               | Potentially significant                 | Mitigation Measure 3.15-a: Implement Measures for Identification and Protection of Paleontological Resources That Could be Discovered on the Project Site during Earthwork        | Less than significant                  |
| <b>3.16 Socioeconomics and Environmental Justice</b>                                                                                                                                                                                            |             |                    |                                                              |                                                    |                                         |                                                                                                                                                                                   |                                        |
| Impact 3.16-a: Potential for Disproportionately High and Adverse Effects on a Minority or Low-income Population                                                                                                                                 | AP, ISL, LS | None               | None                                                         | None                                               | Less than significant                   | No mitigation required                                                                                                                                                            | Not applicable                         |

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# 1.0 PURPOSE OF AND NEED FOR ACTION

## 1.1 INTRODUCTION

Studies by the California Department of Water Resources (DWR), the U.S. Army Corps of Engineers (Corps), Reclamation District (RD) 784, and the Three Rivers Levee Improvement Authority (TRLIA) have found that several reaches of the levee system protecting the RD 784 area, including the lower Yuba River left (south) bank levee and the Feather River left (east) bank levee (the levee on the left side of the river when facing downstream), do not satisfy geotechnical criteria for seepage at the water surface elevation for the 100-year flood event (Kleinfelder 2006). To correct the deficiencies identified along segments of the Feather and Yuba River levees, TRLIA is undertaking the Feather River Levee Repair Project (FRLRP). For planning and design purposes, the levee reaches identified for repairs/improvements in the FRLRP are divided into three project segments (Segments 1, 2, and 3). Proposed improvements to Segment 2, generally consisting of construction of a setback levee and subsequent degradation of the existing levee, compose the project that is the subject of this Environmental Impact Statement (EIS) (Figure 1-1).

To implement the proposed Segment 2 improvements, TRLIA is requesting permission from the Corps pursuant to Section 14 of the Rivers and Harbors Act of 1899 (Title 33 of the United States Code, Section 408 [33 USC 408]), hereinafter referred to as “Section 408”<sup>1</sup> for alteration of a federal project levee, and under Section 404 of the federal Clean Water Act (CWA) (33 USC 1344) for the placement of fill in jurisdictional waters of the United States. The requirement to comply with the National Environmental Policy Act (NEPA) is triggered when major federal actions, including permits and approvals, are considered that may significantly affect the quality of the human environment. The Corps must grant permission for the project pursuant to Section 408 and Section 404, and due to the potential significant effects of the project to the human environment, this EIS was prepared for NEPA compliance. The Corps circulated the draft EIS (DEIS) for the Segment 2 project on July 11, 2008. A Notice of Availability (NOA) was published in the Federal Register on July 11, 2008, and a public meeting on the DEIS was held by the Corps on August 4, 2008, at the Yuba County Government Center in Marysville. The 45-day public review period ended on August 25, 2008. This final EIS (FEIS) has been prepared to respond to agency and public comments received on the DEIS, in accordance with the requirements of NEPA. Comments and responses to comments on the DEIS are contained in Appendix A of this FEIS. All of the project analysis contained in the DEIS has been republished in this FEIS, with modifications and additions provided in response to comments received on the DEIS. The FEIS is being circulated to commenting agencies and individuals and to other interested parties, in accordance with the minimum requirements of the Council on Environmental Quality (CEQ) for circulation of an EIS (40 Code of Federal Regulations [CFR] 1502.19).

Improvements to the existing levees in Segments 1 and 3 have independent utility from the improvements in Segment 2. Segments 1 and 3 improvements have been addressed in a separate planning and design effort and were subject to separate permitting processes, which have been completed. An Environmental Assessment and

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<sup>1</sup> **Section 408. Taking possession of, use of, or injury to harbor or river improvements.** It shall not be lawful for any person or persons to take possession of or make use of for any purpose, or build upon, alter, deface, destroy, move, injure, obstruct by fastening vessels thereto or otherwise, or in any manner whatever impair the usefulness of any sea wall, bulkhead, jetty, dike, levee, wharf, pier, or other work built by the United States, or any piece of plant, floating or otherwise, used in the construction of such work under the control of the United States, in whole or in part, for the preservation and improvement of any of its navigable waters or to prevent floods, or as boundary marks, tide gauges, surveying stations, buoys, or other established marks, nor remove for ballast or other purposes any stone or other material composing such works: Provided, That the Secretary of the Army may, on the recommendation of the Chief of Engineers, grant permission for the temporary occupation or use of any of the aforementioned public works when in his judgment such occupation or use will not be injurious to the public interest: Provided further, That the Secretary may, on the recommendation of the Chief of Engineers, grant permission for the alteration or permanent occupation or use of any of the aforementioned public works when in the judgment of the Secretary such occupation or use will not be injurious to the public interest and will not impair the usefulness of such work.

Finding of No Significant Impact for the Segments 1 and 3 work were completed in July 2007, Corps permission under Section 408 was obtained on August 2, 2007, and construction was initiated soon afterward (note that the Segments 1 and 3 work is considered in a cumulative context in Chapter 4.0 of this FEIS, “Cumulative and Growth-Inducing Effects”). The work required to implement Segments 1 and 3 improvements is being completed on a different schedule from the work proposed for Segment 2.

## **1.2 PROJECT LOCATION AND SETTING**

### **1.2.1 REGIONAL SETTING**

The RD 784 area of Yuba County is bounded by the Yuba River on the north, the Feather River on the west, the Bear River on the south, and the Western Pacific Interceptor Canal (WPIC) on the east (Figure 1-1). The Yuba and Bear Rivers are tributaries to the Feather River, and the WPIC connects with the Bear River upstream of the confluence with the Feather River.

The Feather River and its main tributaries are shown in Figure 1-2. The Feather River drains an area of approximately 5,500 square miles at its confluence with the Bear River and 3,611 square miles above Oroville Dam in Butte and Plumas counties. Between Oroville and Marysville, the Feather River drains an area of 369 square miles, flowing southerly through relatively flat or gently rolling terrain for 39 miles. North and South Honcut Creeks are principal tributaries to the Feather River between Marysville and Oroville and drain about 78 square miles of lower foothill and valley areas east of the Feather River.

### **1.2.2 PROJECT LOCATION**

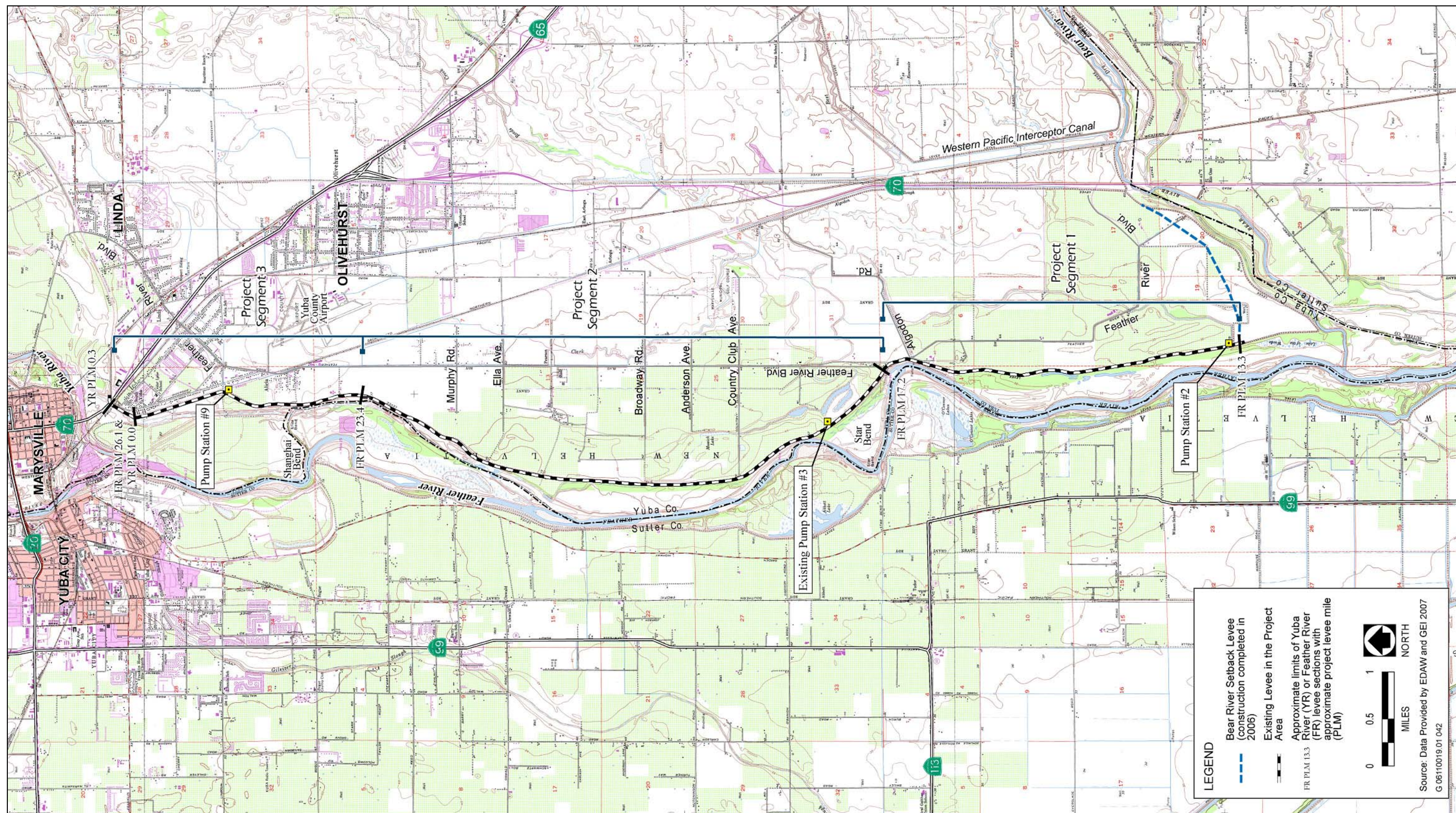
The existing Feather River levee in Segment 2 is part of the federal-state Sacramento River Flood Control Project (SRFCP) within an easement obtained by the State of California through the Sacramento–San Joaquin Drainage District. As shown in Figure 1-1, Segment 2 of the FRLRP is located in southwestern Yuba County, and encompasses a portion of the Feather River left bank levee and lands to the east between Feather River Project Levee Mile (PLM) 17.2 and PLM 23.4 (from approximately Star Bend upstream to near Shanghai Bend, southwest of the Yuba County Airport). This section of levee is approximately 6.2 miles long. The project area is located in Townships 13 and 14 North, Ranges 3 and 4 East, on the U.S. Geological Survey 7.5-minute Olivehurst quadrangle. The proposed setback levee footprint covers approximately 250 acres, and the area between the proposed setback levee alignment and the existing levee encompasses approximately 1,300 acres. Project activities would generally be located in the area between the existing levee and the setback levee, although borrow material is proposed to be obtained from lands east of the setback levee alignment. Refer to Chapter 2.0, “Alternatives,” for further details on the Applicant Preferred Alternative – Above Star Bend (ASB) Setback Levee Alternative.

## **1.3 PROJECT PURPOSE**

The primary purpose of the project is to correct identified deficiencies in the left bank levee of the Feather River, and consequently to improve flood protection in the RD 784 area of Yuba County. The goal for improved flood protection in the RD 784 area is to provide protection against the 0.5% Annual Exceedance Probability (AEP) event.

Protecting against the 0.5% AEP event corresponds to the term “200-year flood protection.” References in this document to levels of flood protection are based on the deterministic approach (the current Federal Emergency Management Agency [FEMA] method) and should not be taken as Corps concurrence that such levels will be achieved when the Corps probabilistic approach is utilized to define system performance. The probabilistic

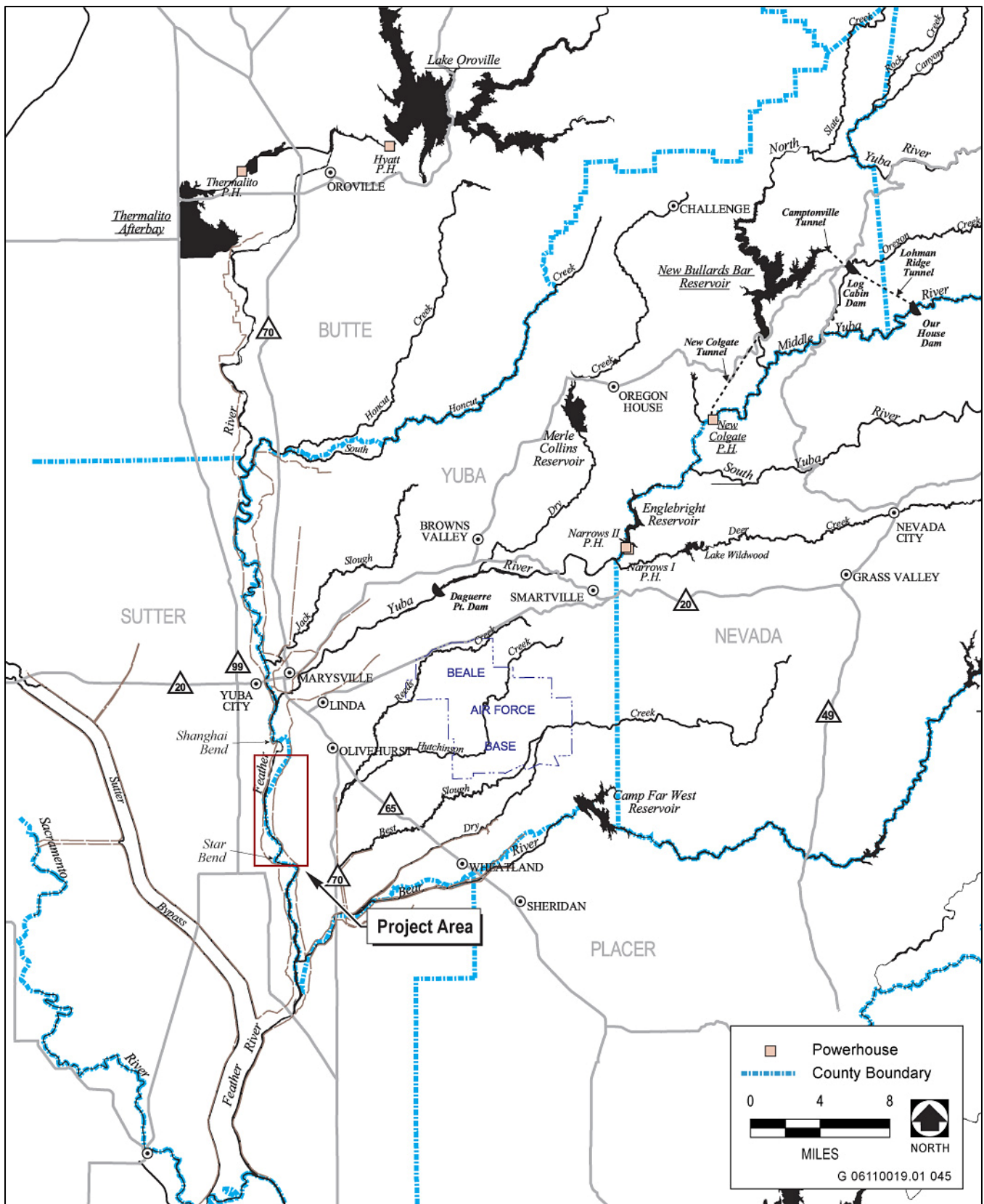




## Project Area

### Figure 1-1





## Regional Setting

Figure 1-2

approach will be used by the Corps when evaluating the Yuba Basin General Re-Evaluation Report (GRR). The GRR is described below in Section 1.8.1, “Corps Flood Protection Projects.” In any case, flood risk to the RD 784 area would be considerably reduced by the proposed project.

Deficiencies in Segment 2 of the Feather River left bank levee are related to a history of boils and heavy underseepage resulting from an overly porous substrate under the levee alignment. The potential for water seepage problems to occur along the existing Feather River levee in the project area is created by discontinuous layers of very loose or loose cohesionless soils (gravels, clean sand, and silty sand) found at varying depths of up to approximately 80 feet. During high-water events, water from the river can enter the pervious gravel layers and then move laterally through these layers and under the levee. Existing hydraulic gradients in Segment 2 are calculated to range from 0.4 to over 1.0, and are estimated to be in excess of 1.0 in the vicinity of Pump Station No. 3 (GEI Consultants 2006a, 2006b). Repairs to the levee would allow a maximum hydraulic gradient of 0.5 at the landside toe of the levee. In addition, sink holes have been observed in different locations, providing evidence of the structural instability. There are also several locations along the water side of the levee segment experiencing erosion. See Section 1.6, “Need for Improved Flood Protection,” for more information. See Chapter 2.0, “Alternatives,” for further details on project design elements.

## **1.4 PURPOSE OF THIS DOCUMENT**

This FEIS will facilitate Corps planning and regulatory activities in connection with Segment 2 of the FRLRP. The July 2008 DEIS described the existing environmental resources in the project area and evaluated and provided full disclosure of the environmental effects of the project alternatives on these resources. The DEIS analysis is republished in this FEIS, with modifications and additions provided in response to comments received on the DEIS. The DEIS and this FEIS have been prepared in accordance with NEPA of 1969, CEQ regulations 40 CFR 1500–1508, and Corps’ Procedures for Implementing NEPA, Engineer Regulation 200-2-2.

Under NEPA, after a lead agency has completed a DEIS, it must obtain comments from public agencies that have legal jurisdiction with respect to the project, and must provide the general public with opportunities to comment on the draft document (40 CFR 1503.1). An FEIS is prepared to respond to those comments and to present the text of the EIS with revisions and updates incorporated. The comments received on the DEIS and responses to those comments are provided in Appendix A of this FEIS. This FEIS may be used by agencies other than the Corps for approvals required to implement the project (e.g., water quality certification from the Central Valley Regional Water Quality Control Board, pursuant to Section 401 of the CWA). Draft and completed permitting documents for the Segment 2 project are contained in the appendices of this FEIS.

The Corps is circulating this FEIS for public review before making a decision on the project. If the Corps determines that the FEIS meets NEPA requirements, it will prepare a record of decision (ROD) regarding its determination that will identify the alternatives considered, specify the environmentally preferred alternative, identify the essential considerations of national policy that were relevant to the decision, and state whether all practicable means to avoid or minimize environmental harm have been adopted (40 CFR 1505.2). Adoption of a monitoring and enforcement program is required.

## **1.5 RESULTS OF SCOPING AND PUBLIC INVOLVEMENT**

### **1.5.1 COOPERATING AGENCIES**

Given constraints associated with project implementation, no federal agencies were invited to serve as a cooperating agency. However, all federal agencies with decision-making interests were contacted through public scoping and/or consultations. (See also Chapter 6, “Consultation and Coordination.”)

## **1.5.2 PUBLIC SCOPING MEETING**

A notice was distributed by the Corps to a mailing list on March 6, 2008, to announce the public scoping meeting and to solicit input on the scope and content of this EIS. The mailing list included public and private landowners within the project area. A notice of intent (NOI) to prepare an EIS was published in the Federal Register on February 29, 2008. Notice of the meeting was published in the Sacramento Bee on March 9, 2008.

The public scoping meeting was held at the Yuba County Government Center in Marysville on March 10, 2008. The Corps planned the meeting to brief interested parties on the Segment 2 project, and obtain the views of local residents and other interested attendees on the scope and content of the EIS. Representatives from the Corps, TRLIA, and environmental and engineering consultants to the Corps were available to answer questions and discuss aspects of the project. Attendees were provided the opportunity to submit comments on the content and scope of the EIS. A court reporter was present at the meeting to record verbal comments, and comment sheets were provided to attendees. Details were given on how to submit comments to the Corps after the meeting. Scoping meeting materials and comments submitted by the one special interest group that provided comments are included in an Appendix K of this FEIS.

## **1.5.3 AREAS OF CONTROVERSY**

A major area of controversy associated with Segment 2 of the FRLRP has been the purchase of private land or easements on private land for project implementation, and the permanent removal of Important Farmland from agricultural use (approximately 290 acres for the Applicant Preferred Alternative – ASB Setback Levee Alternative [Applicant Preferred Alternative] and approximately 270 acres for the Intermediate Setback Levee Alternative). This irretrievable conversion would mostly be land within the setback levee footprints and the parallel easements for these two alternatives. Aside from the acreage in the setback levee footprints, continued farming operations are expected to be feasible in many parts of the levee setback areas under either of the two setback levee alternatives. The Levee Strengthening Alternative would result in a permanent conversion of approximately 30 acres of Important Farmland. Refer to Section 3.1, “Land Use and Agriculture,” for an analysis of this issue.

Although only limited plans for habitat restoration in the setback area are proposed at this time (approximately 60 total acres), future management plans for other portions of the levee setback areas under either of the setback levee alternatives could include restoration of habitat and wetland areas as a substitute for agricultural uses where opportunities are present. Converting agricultural land to riparian and wildlife habitat is controversial in some agricultural communities, especially in the Sacramento Valley, where extensive areas are being converted or are proposed for conversion from agricultural use to riparian habitat. Refer to Section 3.6, “Waters of the United States and Wetlands,” and Section 3.9, “Special-Status Biological Resources,” for a discussion of how the Applicant Preferred Alternative would also provide enhanced habitat conditions in the setback area.

This project would help resolve a current area of known and long-standing controversy, namely, the existing risk of flooding impacts in the RD 784 area, as demonstrated by historical catastrophic flooding events. Overall, repairs to Segment 2 of the FRLRP would reduce the ongoing concern and controversy over flood protection in communities in the area. Any continuing controversy would be related primarily to the potential of the project to induce growth leading to changes in land use patterns and population densities and related impacts on environmental resources. Plans for development of land in the RD 784 area were adopted by Yuba County with the assumption that the area would be adequately protected from future flood events but before studies and investigations by federal, state, and local agencies identified levee instability issues that would subject these new communities to the risk of flooding. Refer to Chapter 4.0, “Cumulative and Growth-Inducing Effects,” for an analysis of environmental effects associated with development in the floodplain.

The Feather River levee in the study area for Segment 2 of the FRLRP is part of the SRFCP. Suggestions that the project has been designed and evaluated as if it were only a local flood control project without consideration for

its connection to the larger SRFCP has been a subject of controversy. However, federal and state agencies with direct roles in permitting the project continue to be involved in review and approval of application materials. In particular, the CVFPB enforces standards for the construction, maintenance, and protection of flood control facilities in the Central Valley. DWR oversees levee operation and maintenance. Project levees in California must meet standards for design and construction specified by the Corps in Engineer Manual 1110-2-1913 (U.S. Army Corps of Engineers 2000) and in the 23 California Code of Regulations (CCR) Section 120. The entire FRLRP, including the Segment 2 project, has been designed to be in compliance with all applicable standards, programs, and practices of the local, state, and federal agencies with responsibilities related to the SRFCP. Also, approval of the new setback levee construction by engineers from the CVFPB and the Corps will be necessary before permission is granted to proceed with work to degrade the existing levee in Segment 2. Refer to Chapter 1.0, "Purpose of and Need for Action," for a discussion of the relationship of the Applicant Preferred Alternative and other action alternatives to the Corps Yuba Basin General Re-Evaluation Report. Refer to Chapter 2.0, "Alternatives," for a general discussion of the design standards for the Applicant Preferred Alternative and other alternatives, which are subject to review and approval by the CVFPB and the Corps. Refer also to Section 3.3, "Surface and Groundwater Hydrology and Geomorphology," for an analysis of the hydraulic effects of the Applicant Preferred Alternative and other alternatives.

Based on documented evidence of boils and underseepage along the FRLRP levees and the urgency of implementing repairs to these levees, work commenced in 2007 on the fully permitted Segments 1 and 3 of the FRLRP. Related work on Segment 2, the middle segment of the FRLRP, began in summer 2008. Environmental review under NEPA for the Segment 2 project is underway. Coordination with state and federal permitting agencies is documented in the permitting materials contained in the appendices to this FEIS. Although the initiation of construction by TRLIA in portions of the Segment 2 area not requiring federal authorization prior to completion of the NEPA process has been identified as a subject of controversy, no construction would be undertaken that is not in full compliance with applicable laws and regulations. Refer to Chapter 2.0, "Alternatives," for a discussion of construction scheduling.

#### **1.5.4 ISSUES TO BE RESOLVED**

The Corps will need to determine whether to grant permission for the project pursuant to Section 408 of the Rivers and Harbors Act of 1899 and Section 404 of the CWA. Section 404 application materials submitted to the Corps in 2007 for the Segment 2 project include the preliminary wetland delineation (the approved jurisdictional determination was completed on March 11, 2008), the Section 404 individual permit application, and the Section 404(b)(1) alternatives analysis (see Appendix B). Consultation under Section 7 of the federal Endangered Species Act (ESA) as well as Section 106 of the National Historic Preservation Act (NHPA) are required components of the Section 404 permit action.

Formal consultation between the Corps, the U.S. Fish and Wildlife Service (USFWS), and the National Marine Fisheries Service (NMFS) was initiated in November 2007. In December 2007, NMFS provided a letter to the Corps determining that the Applicant Preferred Alternative is not likely to adversely affect species under its jurisdiction that might occur in the project area. NMFS also concluded that the Applicant Preferred Alternative would not adversely affect Essential Fish Habitat for Pacific salmon. Receipt of this letter concluded consultation for the Applicant Preferred Alternative (Appendix H). On August 28, 2008, USFWS issued the final biological opinion (BO) addressing the potential effects of the Applicant Preferred Alternative on federally threatened species under their jurisdiction, thereby completing Section 7 consultation between the Corps and USFWS (Appendix H). With issuance of the final BO, no unresolved issues remain related to Section 7 consultation.

The Corps initiated Section 106 consultation with the State Historic Preservation Officer (SHPO) in February 2008. A Memorandum of Agreement (MOA) between the Corps, TRLIA, and the SHPO was prepared to address protection of cultural resources at the Segment 2 project site. In June 2008, the Corps sent the draft MOA to the Enterprise Rancheria and the Advisory Council on Historic Preservation (ACHP) for review and comment. The ACHP subsequently declined to participate in consultation (i.e., no objections were specified in

correspondence sent to the Corps), and no response was received from the Enterprise Rancheria on the draft MOA. With execution of the MOA on July 22, 2008, Section 106 consultation for the project is completed. Additional documents related to protection of cultural resources have been prepared and submitted to the Corps, SHPO, and Enterprise Rancheria in accordance with the terms specified in the MOA. At the time this FEIS was prepared, no comments had been received requiring changes to the MOA or related documents, and no known unresolved issues remain related to Section 106 consultation.

Land uses in the levee setback area under either alternative involving construction of a setback levee would consist of continued agricultural operations and restoration of habitat and wetland areas. The TRLIA board has adopted a policy to maintain as much of the setback area in agricultural use as is economically feasible and subject to ensuring public safety (see the discussion in Section 3.1, “Land Use and Agriculture”). Special operations and maintenance plans would need to be prepared and implemented to ensure the long-term maintenance of any agricultural and/or habitat areas, and to ensure that such areas would not conflict with the flood control function of the levee setback area. Any future management plans would require consultation with affected landowners, resource agencies, and other stakeholders.

## **1.6 EXISTING LEVEE**

### **1.6.1 PHYSICAL FEATURES**

The existing Feather River levee alignment along the western boundary of RD 784 follows the east side of the Feather River from the Bear River setback levee tie-in, near Pump Station No. 2, to the Feather River confluence with the Yuba River where the Feather River left bank levee ties into the Yuba River left bank levee. The Feather River and Yuba River levee alignments lie within the floodplain of the Yuba and Feather Rivers and parallel and intersect the sediment-filled channels of past river meanders. The Corps completed construction of the existing levees in 1941. In general, the levee heights range from about 20 to 30 feet. The levee crown widths are about 20 feet, but are wider in some sections. Typical waterside slopes range from 3:1 (horizontal:vertical) (H:V) to 5:1 H:V, and the landside slopes typically range from 2:1 H:V to 3:1 H:V. A landside berm of variable height and width buttresses the levee along extensive portions of the alignment.

Within Segment 2 (See Figure 1-1), the majority of the existing levee is bordered on the landside by agricultural properties that typically maintain groves of fruit and nut trees. The area between the waterside toe of the levee and the Feather River main channel varies in width with some areas being actively maintained orchards; the other land along the waterside of the levee is otherwise mostly undeveloped. The levee crown elevation above mean sea level (msl) ranges from 66.2 feet msl at Station 247+28 to 76.9 feet msl at Station 575+38. These stations correspond to the south and north ends of the setback levee. (Figure 2-1 in Chapter 2.0, “Alternatives,” provides levee station points of reference along the existing levee.)

The topography along the levee toe is fairly flat and ranges from about 54 feet msl at the northern end of Segment 2, to a low area at about 37 feet msl south of Pump Station No. 3, and to about 46 feet msl at the southern end of the segment. A 280-foot-wide berm runs along the landside toe between Stations 270+00 and 285+00, with the top of the berm at about 42 feet msl; the berm width narrows to 120 feet between Stations 285+00 and 292+00, with the top of the berm at about 40 feet msl. The ground along the landside toe of the berm is at about 31 feet msl, approximately 36 feet below the levee crown.

### **1.6.2 LEVEE DESIGN FLOWS**

The existing levees were designed to pass the “objective” flow with 3 feet of freeboard. The objective flows on the Feather River are 210,000 cubic feet per second (cfs) upstream of the Yuba River mouth and 300,000 cfs between the Yuba River and the Bear River. The objective flow on the Yuba River is 120,000 cfs when the flow in the Feather River at Yuba City is 180,000 cfs, and 180,000 cfs when flow in the Feather River is “low.”



## 1.7 NEED FOR IMPROVED FLOOD PROTECTION

Yuba County has a long history of flooding. Several conditions combine to pose unique challenges for flood control operations in the Yuba-Feather River system. Historical accounts describe large floods on the Feather and Yuba Rivers in 1839–40, 1847, 1850, 1852, 1853, 1861–62, 1867–68, 1881, 1886, and 1889–90. Despite the construction of a system of flood control levees beginning in the early 20<sup>th</sup> century, recorded floods occurred in 1907, 1909, 1928, 1937, 1940, 1962, and 1963, and five major floods—in 1950, 1955, 1964, 1986, and 1997—caused substantial property damage and loss of life. The floods of 1986 and 1997 were especially catastrophic for Yuba County. In January 1997, a levee break occurred on the Feather River north of Star Bend. More than 100,000 people were evacuated from the region during the 1997 flood, which inundated approximately 16,000 acres, damaged or destroyed 800 homes and businesses, and took the lives of three local residents. (Yuba County Water Agency 2003a.)

There is a history of levee distress and levee failure in the Yuba–Feather River area. The 1955, 1986, and 1997 levee failures have been attributed, at least partially, to underseepage. Several areas in Segment 2 of the Feather River east bank levee have a history of boils and heavy underseepage: the reach of levee in the vicinity of Pump Station 3, an area at Country Club Road approximately 1.3 miles upstream of Pump Station No. 3, and an area between Anderson Avenue and Broadway. Adverse seepage conditions have been occurring in these reaches for over 50 years, with continued loss of foundation soils. Internal erosion (or “piping”) of foundation and/or levee materials is a progressive failure mechanism if not arrested. The loss of soil creates cavities that can then collapse and manifest themselves as sinkholes. Sinkholes have been reported adjacent to Pump Station No. 3 and the heavy seepage area between Anderson Avenue and Broadway. After the 1997 flood, sinkholes were also observed to have formed as far as hundreds of feet from the toe of the levee in orchards in the general vicinity of Pump Station No. 3. After the numerous events of high water levels and heavy seepage and piping episodes that the levee and its foundation have experienced, it is possible that portions of the foundation of the levee, the adjacent landside and waterside ground, and perhaps the levee itself, are damaged (i.e., a network of “pipes” or erosional conduits or cavities may have developed that naturally help drain the foundation mass but are inherently unstable). Based on the long-term seepage-related distress at the project area, the history of poor levee performance in the larger Yuba-Feather River area, and the observations of heavy seepage during a moderate high-water event in January 2006 (which was about 10 feet lower than the 200-year design flood elevation in the subject reach), it is considered likely that the integrity of the existing levee and foundation is compromised in its current condition. The potential for a future underseepage failure in the vicinity of Pump Station No. 3 is significant unless the levee and its foundation are further repaired.

Available geotechnical information and other data indicate that a future flood event with a 5% or greater probability of occurring could cause a major levee failure in Segment 2 (TRLIA 2006c). This potential was evidenced by the reactivation, by a moderate high-water event in early January 2006, of historical boils along the Segment 2 levee that had been believed to be permanently repaired by construction measures undertaken by the Corps in 1997 following the 1997 Feather River levee break. In the event of a levee failure, large portions of the RD 784 area could be inundated, as occurred following the 1955, 1986, and 1997 levee breaks; the extent of flooding would depend on the location of the break and hydrologic conditions. In addition, the risk of another major flood in the RD 784 area would likely lead to the designation of the RD 784 area as a fully restricted Special Flood Hazard Area under the regulations of the National Flood Insurance Program. Such a designation would prevent construction of new buildings and other damageable structures in the area where planned development has already progressed over the past several years, and could preclude federal investment or support for improving existing facilities. Such a designation could have a substantial adverse effect on house sales, the local economy, public facilities, and the provision of public services.

The need for levee repairs is to reduce the increased risk and probability of flooding events in RD 784 Service area as a result of the identified deficiencies in the Feather River east bank levee, thus minimizing the potential for catastrophic flooding where homes would be inundated, agricultural operations and other businesses would be damaged and destroyed, and where there would be a significant social impact as well as potential for loss of life.

## **1.8 BACKGROUND ON FLOOD PROTECTION EFFORTS IN THE RD 784 AREA**

### **1.8.1 CORPS FLOOD PROTECTION PROJECTS**

The levees in the entire Sacramento flood control system, including the Feather River east bank levee, were authorized under the Flood Control Act (FCA) of 1917 and subsequently amended by the FCA of 1928, River and Harbor Act of 1938, and the FCA of 1941. The Corps has implemented major modifications, reconstructions, and upgrades over the years in Segment 2 of the Feather River east bank levee in response to deficiencies identified during flood events. These include the construction of three relief wells in early 1956 in the vicinity of Pump Station No. 3 to mitigate a large boil that was observed during the December 1955 flood; six additional relief wells installed in 1958 in the vicinity of Pump Station No. 3 and between Broadway and Anderson Avenue after additional boils were detected during the February 1958 flood; and the enlargement of landside berms in these locations in 1964 in response to the formation of additional boils during the February 1963 high water conditions (a 5-foot-high by 500-foot-wide by 2,000-foot-long berm was constructed immediately downstream of Broadway, and a 5-foot-high by 200-foot-wide by 1,500-foot-long berm was constructed just downstream of Pump Station No. 3). Despite these measures, sand boils continued to form beyond the berms. Several boils were observed during the February 1986 flood between Broadway and Anderson Avenue, at Country Club Road, and near Star Bend. In addition, sinkholes developed near Pump Station No. 3 in 1995. The levee failed catastrophically just north of Country Club Road in January 1997 due to piping of levee and/or foundation sand materials. Also in 1997, new sand boils occurred at the southern end of the landside berm near Pump Station No. 3, approximately 25 feet from the landside toe of the levee.

Two major federal flood protection efforts addressing the RD 784 area, the System Evaluation Project and the Yuba River Basin Project, resulted from the 1986 Central Valley floods and led to additional levee improvements in the RD 784 area.

The Sacramento River Flood Control System Evaluation Phase II Project (abbreviated as “System Evaluation” or “Phase II”), initiated by the Corps and DWR, was intended to restore the design level of flood protection provided by the levees, and reestablished the 1957 design top-of-levee profile. (In general, on the Feather and Yuba Rivers, the 1957 design level for water surface elevation is greater than the water surface elevation for the event designated by the Federal Emergency Management Agency [FEMA] as the “100-year flood.”) Most of the System Evaluation Project levee reconstruction work in RD 784 was completed in 1998. The 1997 flood resulted in the identification of additional seepage problems, however, leading to the Corps’ \$6 million System Evaluation Site 7 Extension Project, which was completed in 2004. Within Segment 2, the Phase II work consisted of the following:

- ▶ “Site 7” levee raising: The Feather River levee crest was re-established to its original grades from PLM 15.9 (below Star Bend) to about PLM 21.4 (north of Pearson Avenue). The height of levee crest raising reportedly ranged from several inches to several feet.
- ▶ Site 7 stability berm: A 10-foot-wide by 7- to 9-foot-high landside stability berm and toe drain were installed between PLM 20.1 and PLM 23.2 (about 1 mile north of Murphy Road).
- ▶ Site 7 cutoff wall: Two cutoff walls were installed as part of the Site 7 work between Broadway and Star Bend. One wall (cutoff wall/geomembrane), a 70-foot-deep soil-bentonite cutoff wall, was installed along the waterside toe of the levee from about PLM 17.2 to PLM 20.3. The soil-bentonite wall construction consisted of removing a portion of the waterside slope; installing the wall within the footprint of the removed slope, and reconstructing the waterside levee slope with a geomembrane and impervious fill. The second wall (cutoff wall only) consisted of a shallower (45 to 50 feet deep) soil-cement-bentonite cutoff wall installed through the crest of the levee along Feather River Boulevard, just downstream of Star Bend, between PLM 16.6 and 17.2.

The System Evaluation project also included Corps installation of slurry walls in two sections of the Marysville ring levee, north of the RD 784 area, in 1996 and 1999.

The Yuba River Basin Project, also referred to as the Yuba River Basin Investigation or the Yuba Basin Project, led to a Corps project designed to achieve what was then considered to be a “200-year” level of protection for RD 784 levees. The Corps in 1998 completed a feasibility study, Congress authorized the project in the Water Resources Development Act of 1999, and a construction start was authorized in 2002. The authorized project included levee modifications on approximately 6 miles of the left bank of the Yuba River, 10 miles of the left bank of the Feather River, and 5 miles of the Marysville ring levee. The objective of the project was to reduce the risk of flooding in RD 784’s service area in a given year to less than the 1 in 200 year storm event and in Marysville to less than the 1 in 300 year storm event. The study included an environmental impact statement/ environmental impact report (EIS/EIR) prepared by the Corps and the Reclamation Board of the State of California (subsequently renamed the Central Valley Flood Protection Board [CVFPB]). At the time of the Corps feasibility study and EIS/EIR, the need for additional flood protection measures for the Bear River and the Western Pacific Interceptor Canal (WPIC) was not known. Therefore, the authorized project did not include any recommended work on either the Bear River Levee or the WPIC (see the discussion below). In addition, in 2003, new Corps underseepage guidelines led to reevaluation of the project, which substantially increased the estimated scope and cost of the project. Because of this scope and cost increase, the Yuba Basin Project must be reauthorized by Congress. A Yuba Basin General Re-Evaluation Report (GRR) is being prepared for submission to Congress for a new authorization and is expected to be available to Congress for its consideration in 2009. The earliest that federal construction under the Corps reauthorized project could begin will be 2011. (Design and construction for the Marysville ring levee project is proceeding separately from the remainder of the Yuba Basin Project. This approach is possible because the design has not changed substantially from the authorized project, basic technical issues regarding the stability of the ring levee have been resolved, and it is hydraulically separate from the rest of the Yuba Basin Project.)

Portions of the planned Yuba Basin Project work overlap with flood system improvements planned and implemented by the Yuba County Water Agency (YCWA) and TRLIA and described below. The Applicant Preferred Alternative – ASB Setback Levee Alternative (also referred to as the “Applicant Preferred Alternative”) evaluated in this EIS, which would be implemented by TRLIA, is scheduled to be initiated prior to the GRR submittal date, with the expectation that the flood protection improvements that are constructed in advance of any Congressional action on the GRR will be found to be consistent with the recommendations contained in the GRR. On that basis, TRLIA anticipates that the non-federal costs incurred in implementation of the Applicant Preferred Alternative could be credited against the remaining non-federal share of the cost of the Yuba Basin Project. More specifically, requests for general credit for flood control under Section 104 of the Water Resources Development Act of 1986 (PL 99-662) would allow the work performed by TRLIA and described in the GRR to be partially credited against the local cost sharing requirements of the federal Yuba Basin Project as long as the project features constructed are compatible with the Corps’ project. Because implementation of the Applicant Preferred Alternative or other alternatives by TRLIA does not immediately use federal funds, it would not result in a commitment of federal resources that would prejudice selection of a GRR alternative before a final decision on the GRR alternatives is made. In addition, the Applicant Preferred Alternative and other alternatives considered in this EIS are restricted to Segment 2 of the Feather River. This is only a small portion of the overall flood protection system considered in the GRR. Implementation of the Applicant Preferred Alternative or alternatives by TRLIA would have little effect on the overall flood protection system considered in the GRR.

In addition to the efforts described above, most recently, the Corps installed four relief wells around the Pump Station No. 3 intake ditch. This work was in response to the appearance of boils in the intake channel, seeps just north of Pump Station No. 3, and boils and seeps along the toe of the seepage berm downstream of the pump station and 300 feet landward of the levee toe during a moderate high-water event in January 2006. Construction was completed in November 2006.

## **1.8.2 YUBA-FEATHER SUPPLEMENTAL FLOOD CONTROL PROJECT**

In response to the catastrophic flood of 1997, YCWA initiated a seven-phase program of flood control studies to identify methods to achieve a higher level of flood protection to Yuba County, particularly for the areas in RD 784 that had been subject to flooding several times in the past. The goal of this effort was to substantially improve the flood protection that would be provided by the System Evaluation Project and the Yuba River Basin Project. As part of this effort, YCWA identified and evaluated a collection of elements representing a comprehensive range of available technology that could provide portions or all of the objective flood control protection. These ranged from relatively minor operational changes providing only a small increment of flood volume reduction to large single-purpose and multipurpose dams with substantial flood volume reductions (Yuba County Water Agency 2003a).

Following the passage of the Costa-Machado Water Act of 2000 (Water Act of 2000) by California voters, YCWA's flood control study team turned the focus of its seven-phase study to those measures that could be achieved within the budget provisions of the Water Act of 2000, which provided for a total of \$90 million in bond funds targeted for the Yuba-Feather River basin. This effort is the Y-FSFCP. Of the \$90 million, \$70 million was targeted for planning, design, and construction work and \$20 million was targeted for environmental mitigation and enhancement.

As part of the Y-FSFCP studies, YCWA prepared a feasibility study that evaluated combinations of three flood control elements (Yuba County Water Agency 2003b):

- ▶ an outlet capacity increase at YCWA's New Bullards Bar Reservoir,
- ▶ forecast-coordinated operations of New Bullards Bar Reservoir and DWR-managed Lake Oroville, and
- ▶ a setback of the left (east) bank levee of the Feather River between Shanghai Bend and the Bear River.

The Y-FSFCP levee setback was proposed for two segments, which were referred to as the Above Star Bend (ASB) and Below Star Bend (BSB) levee setbacks. The ASB levee setback was proposed to extend approximately 5.2 miles along the Feather River, from southwest of the Yuba County Airport to 1 mile downstream of Star Bend. The BSB levee setback was proposed to extend approximately 3.4 miles, from 1 mile downstream of the ASB levee setback to 2,000 feet upstream of the confluence with the Bear River. The environmental impact report for the Y-FSFCP was certified and the program of elements approved by the YCWA Board in March 2004. Additional planning is ongoing between DWR and YCWA to implement forecast-coordinated operations. However, as a result of additional Corps studies, funding from the Water Act of 2000 and local efforts were redirected from a New Bullards Bar outlet capacity increase and Feather River levee setback to address a more comprehensive program of levee improvements for the RD 784 area.

## **1.8.3 TRLIA'S FOUR-PHASE PROGRAM OF FLOOD CONTROL IMPROVEMENTS FOR SOUTHWESTERN YUBA COUNTY**

### **1.8.3.1 IDENTIFICATION OF ADDITIONAL LEVEE DEFICIENCIES**

In May 2003, while YCWA was completing the first level of Y-FSFCP studies described above, the Corps conducted a separate draft floodplain mapping study for DWR on the Feather River and its tributaries. The mapping study identified several deficiencies in freeboard on the Bear River and WPIC levees which did not meet the FEMA accreditation requirements for protecting RD 784 from a "100-year" flood event. (The top of the levee must be at least 3 feet higher than the 100-year event.) This information was unexpected by Yuba County officials because the 1998 Corps Yuba River Basin study did not recommend any work for the Bear River and WPIC levees to achieve a 200-year level of protection for the RD 784 area. In addition, it was found that a 2,800-foot stretch of the Yuba River levee on the upstream side of State Route (SR) 70 did not meet slope stability requirements. These issues were seen as a major setback to the long-term plan to increase the level of flood protection to a 200-year and eventually greater level of protection.

In 1993, following the initiation of the System Evaluation Project and the Yuba River Basin Project, and before the most recent devastating flood (in 1997), Yuba County had approved the Plumas Lake Specific Plan, which provides for a 12,000-home development on 5,200 acres in the southern portion of the RD 784 area. Development was initiated in the Plumas Lake Specific Plan area in 2002. The results of the 2003 Corps floodplain mapping study indicate that the people and property in the RD 784 area, including homes that had already been built in the Plumas Lake Specific Plan area before the release of the Corps study, are subject to a much higher flood risk than previously believed. Without levee improvements that FEMA can accredit as providing protection against the 1% chance annual flood, FEMA may publish new Flood Insurance Rate Map (FIRM) panels for the RD 784 area. Once the FIRM panels are published, flood insurance rates for the area may increase, and carrying flood insurance would become mandatory.

To avoid having RD 784 mapped into the FEMA 100-year floodplain, FEMA will need to be provided data showing that the levees meet various criteria in accordance with the requirements contained in 44 Code of Federal Regulations 65.10. Consequently, YCWA, RD 784, and Yuba County, in consultation with many landowners and developers in the south county, elected to move aggressively on a program for evaluating options for achieving FEMA accreditation of the RD 784 levees. One step was the formation of TRLIA, a joint powers authority composed of Yuba County and RD 784 that was formed to address funding and implementation of levee repairs for the RD 784 area.

RD 784 first completed a Problem Identification Study to determine the magnitude of the repair effort necessary to achieve FEMA accreditation and a higher level of protection on the WPIC and Bear River levees. A geotechnical engineering report was prepared in November 2003 that identified significant geotechnical problems with the levee foundations along most of the Bear River levee and several reaches of the WPIC levee. Areas of concern with regard to erosion were also identified. Subsequently, a more in-depth engineering study was initiated to develop design alternatives to meet the study objectives and develop plans and specifications for some of the selected construction elements that compose the resulting FEMA levee accreditation program, including repairs and improvements to the upper Bear River and WPIC levees.

### **1.8.3.2 TRLIA'S PHASED PROGRAM**

Since 2003, various studies have been completed to determine necessary actions for RD 784 levees to meet current FEMA accreditation requirements as well as provide a 200-year level of flood protection. Based on the results of these studies, flood control improvements were planned for implementation in phases, as described below, with the intent to construct those features that would most economically provide the desired level of flood protection. The Applicant Preferred Alternative – ASB Setback Levee Alternative is part of Phase 4. Figure 1-3 shows the locations of projects listed below that have been completed and that are underway.

TRLIA anticipates that the GRR described above will include many of these features that TRLIA has constructed and that Section 104 credits will be provided to TRLIA for the completed early implementation work.

#### **Phase 1 Improvements (completed 2004)**

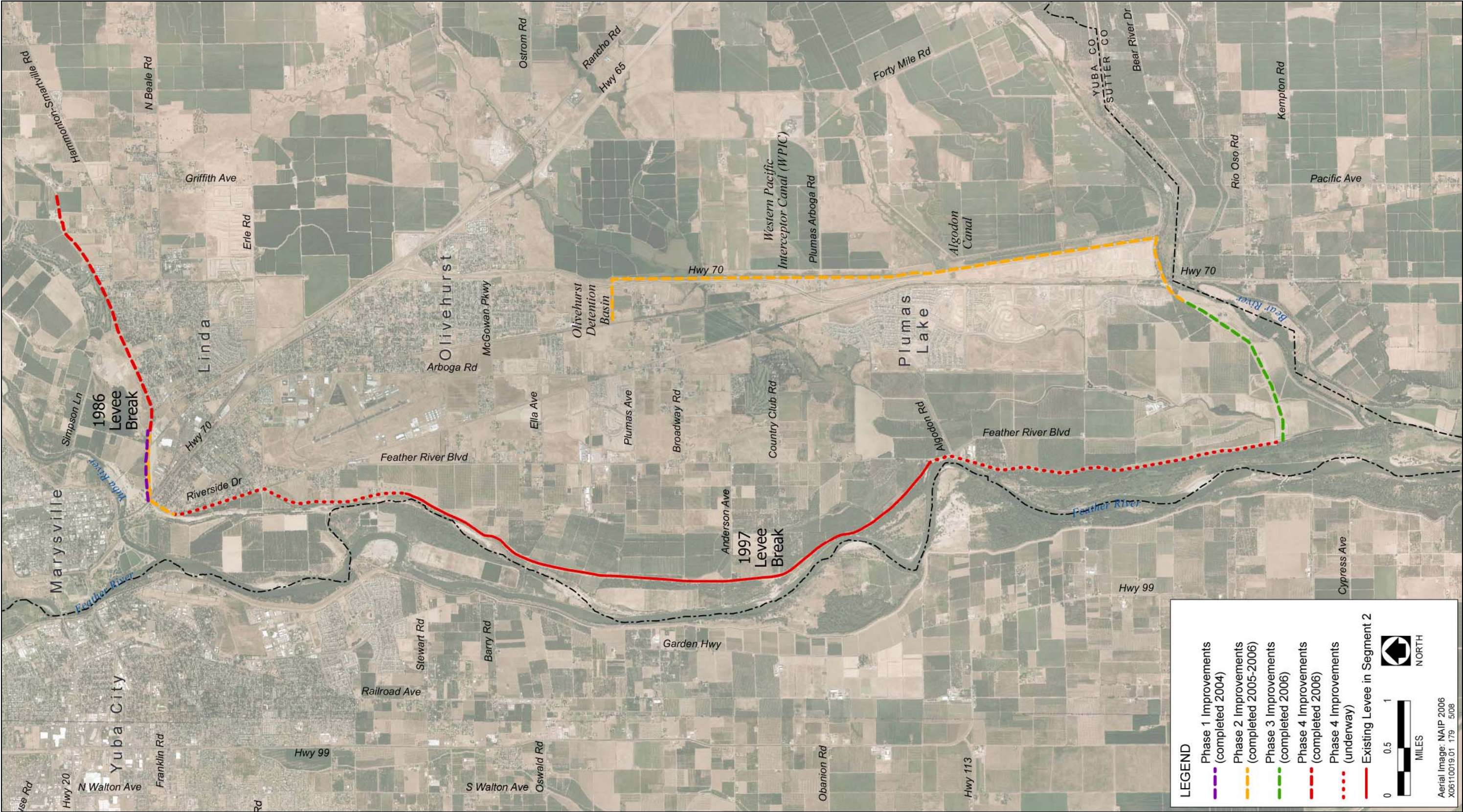
**Yuba River Levee:** Construction of a 50-foot-deep slurry cutoff wall through the top of the levee from SR 70 to a site that breached in 1986, for a total length of 2,200 feet.

#### **Phase 2 Improvements (completed 2005)**

**Yuba River Levee:** Construction of 90- and 300-foot-wide landside seepage berms to protect against underseepage.

**Olivehurst Detention Basin:** Improvements to major drain channels in the Olivehurst basin to accommodate 100-year flows; construction of a detention basin to store floodwaters.





Source: Data provided by TRLIA in 2007 and 2008, Yuba County 2006

Status of TRLIA's Flood Control Projects

Figure 1-3



**Western Pacific Interceptor Canal (WPIC) Levee:** Construction of a 500-foot-long, 38-foot-deep slurry cutoff wall and a 1,100-foot, 44-foot-deep slurry cutoff wall to minimize underseepage at Plumas Lake. Also, filling of an existing landside toe ditch to provide protection against underseepage.

**Upper Bear River Levee:** Reconstruction of 300 feet of levee and rock slope protection at the confluence with the WPIC to provide erosion protection.

## **Phase 2 Improvements (completed 2006)**

**Olivehurst Detention Basin:** Construction of a ring levee between SR 70 and the Clark Lateral levee.

**WPIC Levee:** Construction of a levee crown raise to provide adequate freeboard.

**Upper Bear River Levee:** Construction of a levee crown raise to provide adequate freeboard and a waterside impervious zone to prevent through-seepage.

**RD 784 Pump Station No. 6:** Removal of the pump station and installation of a new pump station to protect against underseepage at the Algodon Canal.

## **Phase 3 Improvements (completed 2006)**

**Lower Bear River Levee:** Construction of a 2-mile-long setback levee to replace 3 miles of existing levee at the confluence of the Bear and Feather Rivers and associated infrastructure (e.g., detention basins, relief wells) and habitat restoration plantings. This project precludes the need to improve the Feather River left bank levee below Pump Station No. 2 (see Figure 1-1).

## **Phase 4 Improvements: (completed 2006)**

**Upper Yuba River Levee:** Construction of a cutoff wall between the Union Pacific Railroad track and Simpson Lane to protect against underseepage has been completed. Engineering design is progressing on related work to fill a ditch along the water side of the Yuba River levee east of Simpson Lane near the Goldfields.

## **Phase 4 Improvements: Feather River Levee Repair Project**

**FRLRP Segments 1 and 3 (underway):** Repair and strengthening the existing levees in place to correct these deficient levee segments. This work has been separately planned, permitted, and designed, and is being completed on a different schedule from the work that is proposed for Segment 2. With the project approval and permitting processes completed, construction on Segments 1 and 3 began in fall 2007 and will be completed in fall 2008. The levee repairs consist primarily of installation of slurry cutoff walls, stability berms, waterside blankets, and relief wells at various locations along Segments 1 and 3.

**FRLRP Segment 2 (proposed):** The subject of the July 2008 DEIS and this FEIS, described in Chapter 2.0.

The FRLRP is an updating of the Feather River and lower Yuba River levee improvements previously evaluated in the Y-FSFCP EIR. The Applicant Preferred Alternative – ASB Setback Levee Alternative being evaluated in this EIS, construction of a setback levee and degradation of the existing levee in Segment 2 of the FRLRP, was evaluated in an EIR prepared by TRLIA for the entire FRLRP in accordance with the requirements of the California Environmental Quality Act (CEQA) Statutes (Public Resources Code Sections 21000 et seq.) and the State CEQA Guidelines (Title 14, Section 15000 et seq.

of the California Code of Regulations). The EIR was not simply reprinted for use as this EIS because the requirements for the scope, content, and format of an EIR under CEQA differ in many respects from the requirements for the scope, content, and format of an EIS under NEPA. Although joint CEQA/NEPA documents are often prepared, with the information and analysis provided in a manner that satisfies both regulations, a CEQA only document cannot alone meet the requirements of NEPA and be used as an EIS. Therefore, this separate EIS is prepared for the Applicant Preferred Alternative and other alternatives even though an EIR has already been completed for very similar actions and alternatives.

## 1.9 PROJECT AUTHORIZATION

The Feather River levee included in the FRLRP project area, as part of the Sacramento River Flood Control Project (SRFCP), is a “federal project levee.” As stated above, the levees in the entire SRFCP, including the Feather River east bank levee, were authorized under the Flood Control Act (FCA) of 1917 and subsequently amended by the FCA of 1928, River and Harbor Act of 1938, and the FCA of 1941. Significant alterations to a federal project levee by a non-federal entity are subject to permission from the Chief of Engineers under Section 408 (Title 33 of the United States Code, Section 408 [33 USC 408]) based on a determination that the alterations would not be injurious to the public. The specific Segment 2 activities that would alter the federal levee are the construction of the “tie-ins” to the existing levee (i.e., the sections of new levee that would connect the ends of the setback levee to the existing levee) and ultimate acceptance of the setback levee in Segment 2 as the federal levee, with associated decommissioning of the existing levee in Segment 2. TRLIA has requested CVFPB permission to complete these activities, and the CVFPB has requested Corps permission pursuant to Section 408 for these alterations as proposed by TRLIA.

In addition, the Corps is considering the individual CWA Section 404 (33 USC 1344) permit application submitted by TRLIA that requests permission for the discharge of fill into waters of the United States, including wetlands. Those elements of the Applicant Preferred Alternative – ASB Setback Levee Alternative that would entail the discharge of fill into waters of the United States are the setback levee crossing of Plumas Lake Canal and construction of the floodplain drainage swale. Appendix B includes a copy of the preliminary wetland delineation, the delineation verification letter, an updated verification letter, the individual permit application, and a Section 404(b)(1) alternatives analysis. Consultation under Section 7 of the ESA as well as Section 106 of the NHPA must be completed as components of the Section 404 permit action. The Section 404 permit will be approved after Section 408 permission has been granted.

These permissions are necessary for completion of the Applicant Preferred Alternative – ASB Setback Levee Alternative. In addition, Corps completion of the GRR for the Yuba Basin Project and subsequent Congressional reauthorization of the modified Yuba Basin Project, as described above, would be necessary for federal participation in the project.

A variety of state authorizations provide or provided TRLIA funding to study and implement the proposed project including the Costa-Machado Water Act of 2000 (Water Act of 2000) and Proposition 1E: The Disaster Preparedness and Flood Prevention Bond Act of 2006. The Central Valley Flood Protection Act of 2008, as expressed in Sections 9600–9603 of the California Water Code, directs that urbanized areas, such as much of RD 784, be provided flood protection for the 0.5% probability event.

## 1.10 RELATED DOCUMENTS

This report satisfies federal environmental reporting requirements pursuant to NEPA. The information contained in the following related documents should be considered when reviewing this report:

- ▶ U.S. Army Corps of Engineers and State of California Reclamation Board. 1998 (April). *Yuba River Basin Investigation, California, Final Environmental Impact Statement/Environmental Impact Report*. Sacramento,



CA. Prepared by the U.S. Army Corps of Engineers, Sacramento District and The Reclamation Board, State of California, Sacramento, CA.

- ▶ Yuba County Water Agency. 2003b (June). *Report on Feasibility, Yuba-Feather Supplemental Flood Control Project*, including supporting appendices. Marysville, CA. Prepared by Flood Control Study Team. Prepared for submittal to California Department of Water Resources, Sacramento, CA.
- ▶ Yuba County Water Agency. 2003a (October). *Draft Environmental Impact Report for the Yuba-Feather Supplemental Flood Control Project*. State Clearinghouse #2001072062. Marysville, CA. Prepared by EDAW, Jones & Stokes, and Flood Control Study Team.
- ▶ Yuba County Water Agency. 2004 (March). *Final Environmental Impact Report for the Yuba-Feather Supplemental Flood Control Project*. State Clearinghouse #2001072062. Marysville, CA. Prepared by EDAW, Jones & Stokes, and Flood Control Study Team.
- ▶ Three Rivers Levee Improvement Authority. 2004a (August). *Final Environmental Impact Report for the Bear River and Western Pacific Interceptor Canal Levee Improvements Project*. State Clearinghouse #2004032118. Marysville, CA. Prepared by Jones & Stokes, Sacramento, CA.
- ▶ Yuba County Water Agency and Three Rivers Levee Improvement Authority. 2004 (October). *Report on Feasibility of RD 784 Supplemental Flood Control Improvements of the Yuba-Feather Supplemental Flood Control Project*. Marysville, CA. Prepared by Flood Control Study Team. Prepared for submittal to California Department of Water Resources, Sacramento, CA.
- ▶ Three Rivers Levee Improvement Authority. 2004b (September). *Draft Environmental Impact Report for the Feather Bear Rivers Levee Setback Project*. State Clearinghouse #2004072113. Marysville, CA. Prepared by EDAW and Flood Control Study Team.
- ▶ Three Rivers Levee Improvement Authority. 2004c (November). *Final Environmental Impact Report for the Feather Bear Rivers Levee Setback Project*. State Clearinghouse #2004072113. Marysville, CA. Prepared by EDAW and Flood Control Study Team.
- ▶ Three Rivers Levee Improvement Authority. 2006b (August). *Draft Environmental Impact Report for the Feather River Levee Repair Project, an Element of the Yuba-Feather Supplemental Flood Control Project*. State Clearinghouse #2006062071. Marysville, CA. Prepared by EDAW and Flood Control Study Team.
- ▶ Three Rivers Levee Improvement Authority. 2006a (November). *Final Environmental Impact Report for the Feather River Levee Repair Project, an Element of the Yuba-Feather Supplemental Flood Control Project*. State Clearinghouse #2006062071. Marysville, CA. Prepared by EDAW and Flood Control Study Team.
- ▶ U.S. Army Corps of Engineers. 2007 (July). *Environmental Assessment Feather River Levee Repair Project, California Segments 1 and 3*. Sacramento, CA. Prepared by the U.S. Army Corps of Engineers, Sacramento District.

The EIR prepared for the FRLRP (TRLIA 2006a and 2006b) provides a significant amount of project-specific setting and analytical information referenced in this EIS. The draft and final EIRs are therefore incorporated into this EIS by reference.

## 2.0 ALTERNATIVES

This chapter describes the alternatives that were considered to provide additional flood protection to the Reclamation District (RD) 784 area consistent with the project's primary flood control objective. Although they provide contrasting advantages and disadvantages, each of the alternatives is considered feasible based on relevant economic, environmental, social, technological, and legal factors.

### 2.1 ALTERNATIVES ELIMINATED FROM DETAILED DISCUSSION

The concept of placing a setback levee east of the currently proposed setback levee alignment was considered. However, a preliminary hydraulic evaluation found that the negligible increase in potential flood control benefits relative to the proposed action would be outweighed by impacts on property, facilities, and landowners by placing additional land in the floodplain. In particular, constructing the setback levee alignment farther east of the alignment for the Applicant Preferred Alternative – Above Star Bend (ASB) Setback Levee Alternative (also referred to as the “Applicant Preferred Alternative”) would be impracticable from logistical and cost perspectives because immediately east of the proposed alignment is commercial development and numerous residential properties, which would be displaced by a more eastern alignment. Construction of the setback levee through the commercial and residential property would require additional real estate and relocation costs and also presents the possibility of encountering contaminated soil sites at some commercial properties. Such a shift would have little to no measurable hydraulic benefits and very high additional costs. The resulting cost is likely to be above the reasonable cost to construct this type of project. Additionally, Feather River Boulevard runs just to the east of the Applicant Preferred Alternative. An eastern shift of the setback levee alignment would adversely affect Feather River Boulevard and occupied residences on each side of Feather River Boulevard. It was determined to be impractical to place the setback levee east of Feather River Boulevard, thereby requiring realignment of Feather River Boulevard. This approach would also increase land acquisition needs and greatly increase project costs and complicate the construction effort. Therefore, alternatives to the Applicant Preferred Alternative that place the setback levee east of the proposed alignment were not evaluated further.

Setback levee alignments to the west of the Intermediate Setback Levee Alternative (see Section 2.2.3, “Intermediate Setback Levee Alternative”) were also considered. However, placing a levee in this area, particularly along the southern portion of the alignment, would intersect more of the Plumas Lake Canal, the Messick Lake area, and other waters of the United States (U.S.). A setback levee following this alignment would also provide reduced hydraulic benefits as well as intersect more areas of poor or unsuitable soils for a levee foundation. Given the increased environmental impacts, reduced hydraulic benefits, and engineering challenges associated with setback levee alignments located west of the Intermediate Setback Levee Alternative, alternatives in this area were not evaluated further.

An alternative flood protection method for development in the RD 784 area that would be outside the jurisdiction of the U.S. Army Corps of Engineers (Corps) would be for local agencies and/or private entities to provide flood protection for developed areas through construction of ring levees, and flood protection for specific structures by raising structures above the 100-year flood stage elevation. However, ring levees would not be feasible in the area protected by the existing Segment 2 levee due to the dispersed nature of development. Over 5 miles of ring levee would be required to protect existing development in the Plumas Lakes area along Highway 70 and just north of the Bear River (see Figure 1-3). 2 miles or more of ring levee would be needed to protect two residential enclaves associated with the golf course along Country Club Road. More than 6 miles of ring levee would be required to protect existing development in the vicinity of Broadway Road, Plumas Avenue, and McGowan Parkway. Additional ring levees would be required to protect relatively isolated residences, pockets of residential development, and commercial and industrial facilities such as a fruit packing plant just east of the Applicant Preferred Alternative alignment. Providing sufficient ring levees to protect existing development protected by the current Segment 2 levee would require construction of 2–3 times more miles of levee than the Applicant Preferred Alternative alignment. Individual land owners, groups of landowners in aggregate, and the local jurisdictions do

not have sufficient resources to implement this extent of levee construction. Significant importation of suitable fill material and environmental impacts associated with development of a substantial number of soil borrow sites would also occur if ring levees were constructed. In addition, implementing this approach would leave portions of Highway 70 exposed to inundation during a levee breach, and would still require additional expenditures to raise isolated structures above the 100-year flood stage elevation. This approach also would not provide hydraulic benefits associated with expanding the Feather River floodway if a setback levee were constructed. Given the financial infeasibility of providing flood protection to existing development via ring levees and raising individual structures, engineering challenges associated with this approach (e.g., obtaining sufficient suitable fill material), reduced hydraulic benefits, and the fact that important infrastructure (e.g., Highway 70) would not be fully protected, alternatives involving ring levees and raising individual structures were not evaluated further.

## 2.2 ALTERNATIVES CARRIED FORWARD IN THIS EIS

Four project alternatives were evaluated in the July 2008 draft environmental impact statement (DEIS). The DEIS analysis is republished in this final EIS (FEIS), with modifications and additions provided in response to comments received on the DEIS. The four project alternatives evaluated in this EIS are:

- ▶ the No-Action Alternative,
- ▶ the Applicant Preferred Alternative – ASB Setback Levee Alternative, consisting of constructing and maintaining a new setback levee, removing all or portions of the existing levee, and completing related activities along Segment 2 of the Feather River Levee Repair Project (FRLRP) area (see Figure 2-1),
- ▶ the Intermediate Setback Levee Alternative, consisting of constructing and maintaining a new setback levee following an intermediate alignment similar to that of the Applicant Preferred Alternative, but with a portion being located up to approximately 1,000 feet west of the setback levee for the Applicant Preferred Alternative (Figure 2-1), and
- ▶ the Levee Strengthening Alternative, consisting of repairing and strengthening the existing Feather River levee along Segment 2, with no setback levee being constructed.

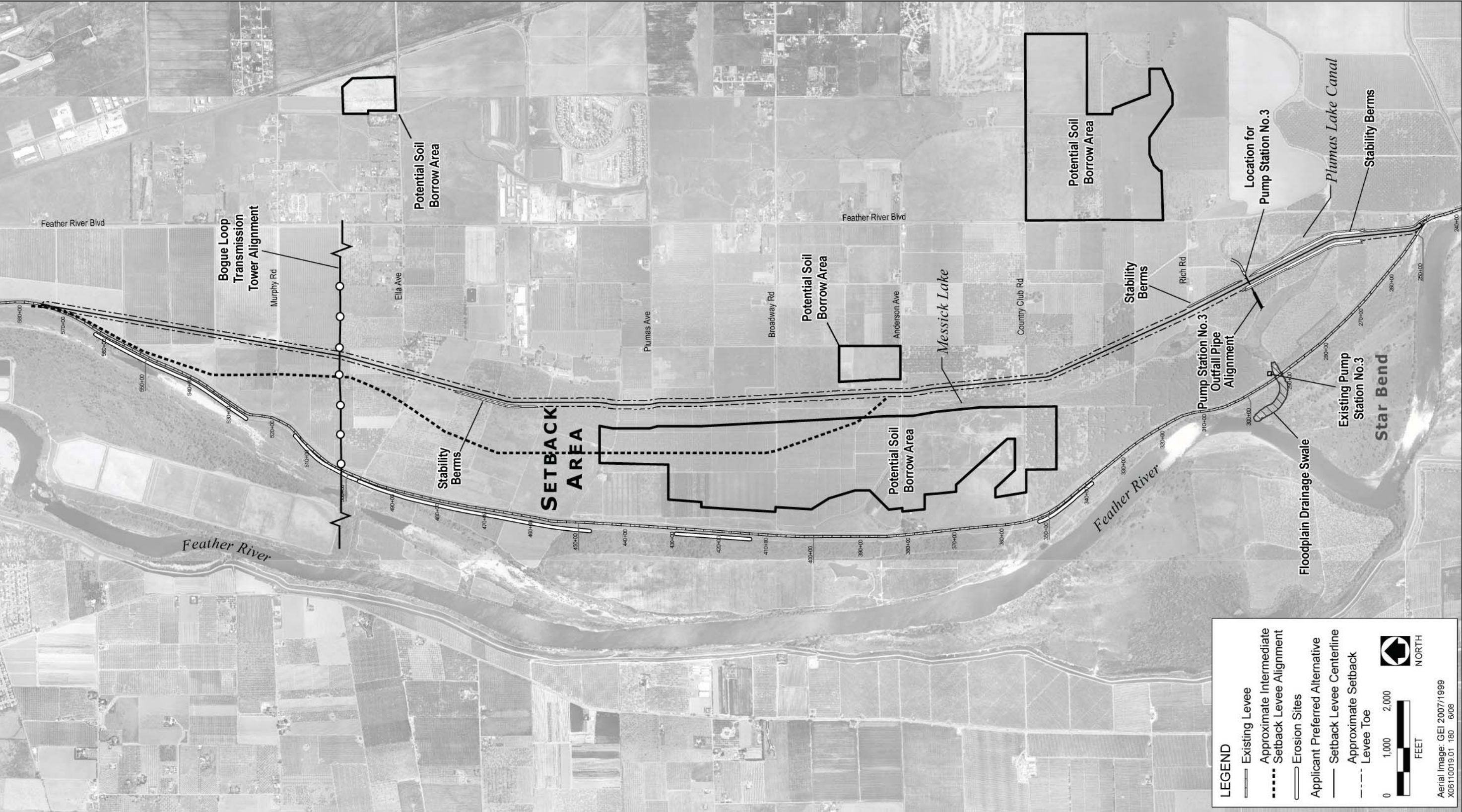
These alternatives are described in detail in the sections that follow. Section 2.3 compares the effects of the alternatives.

As described in Chapter 1, “Purpose of and Need for Action,” the proposal to implement a setback levee in Segment 2 of the FRLRP is an expansion and modification of the Above Star Bend (ASB) levee setback previously evaluated in the programmatic EIR for the Yuba-Feather Supplemental Flood Control Project (Y-FSFCP) (Yuba County Water Agency 2003b). Project Segment 2 extends from Feather River project levee mile (PLM) 17.2 to PLM 23.4. This area includes the ASB levee setback described in the Y-FSFCP programmatic EIR. A levee setback was considered in this area for several reasons:

- ▶ a setback levee would replace the existing levee, thereby “correcting” any deficiencies in the existing levee;
- ▶ hydraulic and flood control benefits would be achieved by widening an existing narrow point in the river;
- ▶ a new setback levee would be constructed using materials and methods consistent with modern standards; and
- ▶ a setback levee placed sufficiently eastward of the existing levee could be placed on soils more suitable for supporting a levee foundation.

The ASB setback levee alignment included in the Y-FSFCP programmatic EIR provided a basis for identifying alternatives for Segment 2 of the FRLRP. TRLIA staff members, project engineers, hydrologists, and others have





Source: Data provided by GEI Consultants in 2007 and 2008

Applicant Preferred Alternative – ASB Setback Levee Alternative and Other Alternatives

Figure 2-1



conducted various studies, meetings, and workshops during the past several years to further develop and refine project alternatives.

The Applicant Preferred Alternative – ASB Setback Levee Alternative in this EIS includes a setback levee in Segment 2 that generally follows the alignment of the ASB setback levee included in the Y-FSFCP programmatic EIR. However, as part of the alternatives development process, the northern portion of the setback levee alignment was extended to encompass an area of seepage concerns identified in the *Problem Identification Report (PIR)*, *TRLIA Phase 4 Feather River and Yuba River Left Bank Levees, Reclamation District No. 784* (Kleinfelder 2006). The Applicant Preferred Alternative was selected for analysis in this EIS because it allows the Corps to evaluate an alternative that provides the benefits of the ASB setback levee listed above, while weighing these benefits against impacts on property, facilities, and landowners associated with placing new lands in the expanded floodway.

The other setback levee alignment being evaluated in this EIS is the Intermediate Setback Levee Alternative (Figure 2-1). Evaluation of a setback levee alignment between the alignment for the Applicant Preferred Alternative and the existing Feather River levee allows consideration of an intermediate condition, or a balance of benefits and impacts: because of the smaller setback area, hydraulic and flood control benefits could be reduced, but impacts on property, facilities, and landowners associated with placing new lands in the expanded floodway would also be reduced. Factors considered for potential intermediate setback alignments included the suitability of underlying soil conditions to support a levee foundation, the goal of minimizing the splitting of landowner parcels, and effects on potential upstream hydraulic benefits.

Strengthening the existing levee in place is being considered as an alternative approach for Segment 2 to allow evaluation of the effects of correcting the levee deficiencies without obtaining the hydraulic and flood control benefits of a setback levee. Strengthening the existing levee in Segment 2 would avoid any impacts on property, facilities, and landowners associated with placing new lands in the floodplain. This approach is reflected in this EIS by the Levee Strengthening Alternative.

The following sections describe the alternatives that were carried forward for detailed analysis in this EIS.

## **2.2.1 No-ACTION ALTERNATIVE**

For the purposes of National Environmental Policy Act (NEPA) compliance, the No-Action Alternative serves as the baseline against which the impacts and benefits of the Applicant Preferred Alternative – ASB Setback Levee Alternative and other alternatives are evaluated. The No-Action Alternative consists of the conditions that would be reasonably expected to occur in the foreseeable future if the Corps did not grant permissions to Three Rivers Levee Improvement Authority (TRLIA) to alter the existing levee or to discharge dredged or fill material into waters of the U.S. As described later in this EIS, alternatives entailing the construction of a setback levee would require the fill of segments of irrigation canals that constitute waters of the U.S., and an alternative that entails repair of the existing levee would require erosion remediation below the ordinary high water mark of the Feather River and fill of a section of the Plumas Lake Canal, activities that would also be considered fill of waters of the U.S. Consequently, TRLIA's implementation of any action alternative developed for analysis in this EIS would require the issuance of a Section 404 permit. Additionally, repair of the identified deficiencies in the Feather River left bank levee would require Corps permission for alteration of a Federal Project levee. Therefore, TRLIA, lacking Corps authorization to undertake repairs to the Feather River left bank levee in Segment 2, would not complete necessary repairs to this levee under the No-Action Alternative.

Given the known deficiencies in this levee segment and its inclusion as part of the federal flood control system, it is reasonable to assume that the Corps and/or the State of California would repair the existing levee at some time in the future to meet the federal and/or state flood protection obligations associated with the federal flood control system. In addition, repairs to the Feather River left bank levee may be performed to meet the objectives of the Yuba Basin Project, which include reducing the risk of flooding in the RD 784 service area in a given year

to less than the 1-in-200 year storm event. As discussed in Section 1.4, “Need for Improved Flood Protection,” the Corps is preparing a General Re-Evaluation Report (GRR) for the Yuba Basin Project that is expected to be available to Congress for its consideration in 2009, and the earliest that construction under the Congressionally reauthorized Corps project could begin would be 2011. Therefore, the Corps and/or the State of California would be unlikely to begin repairs on Segment 2 before 2011, and it is more likely that such work would begin as much as 5–10 years later because of funding and other constraints. Based on the criteria used by TRLIA to select alternatives for analysis (e.g., levels of flood protection to be provided, cost, operation and maintenance requirements), it can be expected that one of the three action alternatives described below, or an action very similar to one of these actions, would be implemented by the Corps and/or the State and that the environmental effects of project construction would be the same as, or very similar to, those of the action alternatives evaluated in this EIS. In the period before implementation of FRLRP Segment 2 levee repairs, however, available geotechnical information and other data indicate that a future flood event with a 5% or greater probability of occurring could cause a major levee failure in this area (TRLIA 2006c).

To meet the intent that the environmental analysis provide the basis for comparing the impacts of implementing an action alternative with the impacts of no action being taken, however, the No-Action Alternative in this analysis consists of the conditions that would likely prevail along Segment 2 of the Feather River levee and areas provided flood protection by the Segment 2 levee if no action was taken by TRLIA, the State, or the Corps to repair this deficient levee segment requiring Section 408 authorization [33 USC 408] for alteration of a federal project levee, NEPA approval, or an individual permit under Section 404 of the federal Clean Water Act (CWA) (33 USC 1344) for dredge or fill of waters of the U.S. Minor levee repairs not meeting these criteria, for example, correction of erosion sites that might be authorized under CWA Nationwide Permit (NWP) #3, could be implemented. The Feather River left bank levee in Segment 2 would remain in its current condition other than potential implementation of relatively minor repairs. Significant deficiencies, including underseepage potential and through-seepage potential identified in Segment 2 would remain unaddressed. Pump Station No. 3 would remain in its current condition at its current location. RD 784 would continue its current inspection and maintenance program along the Segment 2 levee. Based on this available information, periodic maintenance as well as repairs that do not trigger Section 408 authorization, NEPA, or a CWA individual permit would not adequately address these deficiencies. This scenario is consistent with the Yuba Basin GRR Future No-Action Condition.

Under the No-Action Alternative a substantial risk of levee failure and flooding of the RD 784 area would remain as a result of the previously identified deficiencies. This potential was evidenced by the reactivation, by a moderate high-water event in early January 2006, of historical boils along the Segment 2 levee that had been believed to be permanently repaired by construction measures undertaken by the Corps in 1997 following the 1997 Feather River levee break. In the event of a levee failure, large portions of the RD 784 area could be inundated, as occurred following the 1955, 1986, and 1997 levee breaks; the extent of flooding would depend on the location of the break and hydrologic conditions. The most recent flooding of RD 784 followed the 1997 failure of the Feather River levee in Segment 2. Within the 16,500-acre RD 784 area during this event, 16,000 acres were inundated, 800 homes and businesses were damaged or destroyed, and three people were killed. It should be noted that not all of this flood damage was directly attributable to the breach in the Feather River levee. Some flooding and associated damage was due to smaller water courses in the eastern portion of RD 784 leaving their banks due to excessive stormwater flows. The area protected by the Segment 2 levee encompasses approximately 13,400 acres in the southwestern portion of RD 784, including the Plumas Lakes residential area, portions of Highway 70, and various developments along Country Club Road, Broadway Road, Plumas Avenue, Ella Road, and Feather River Boulevard (see Figure 1-3). A future levee failure could result in similar catastrophic losses and prolonged interruption of regional commercial activity as the 1997 flood.

## **2.2.2 APPLICANT PREFERRED ALTERNATIVE – ASB SETBACK LEVEE ALTERNATIVE**

### **2.2.2.1 OVERVIEW**

Most of the levee system in Yuba County was constructed during the 1920s using construction practices of that era. Studies by the Department of Water Resources (DWR), the Corps, RD 784, and TRLIA have found that several reaches of the levee system protecting the RD 784 area do not satisfy geotechnical criteria for seepage at the water surface elevation for the 100-year flood event. For more detailed information on the history of the levee and previous flood protection improvements please see Section 1.6, “Need for Improved Flood Protection,” and Section 1.7, “Background on Flood Protection Efforts in the RD 784 Area.”

A detailed analysis of the Feather River levee was performed by Kleinfelder and is described in the PIR (Kleinfelder 2006). The PIR addresses the Feather River left bank levee from approximately PLM 13.3 near RD 784 Pump Station No. 2 (Figure 1-1) to the beginning of the Yuba River left bank levee at approximately PLM 26.1, and the Yuba River left bank levee from PLM 0.0 to PLM 6.1. The purpose of the analysis described in the PIR was to perform a feasibility-level evaluation of subsurface geotechnical conditions and levee conditions in accordance with Federal Emergency Management Agency (FEMA) requirements. The conclusions of the PIR indicate that portions of the subject levee do not currently meet FEMA geotechnical certification requirements for through-seepage or underseepage. The Applicant Preferred Alternative – ASB Setback Levee Alternative described below, and analyzed in this EIS, is being considered to correct the deficiencies identified in the PIR along Segment 2 of the FRLRP.

### **2.2.2.2 APPLICANT PREFERRED ALTERNATIVE – ASB SETBACK LEVEE ALTERNATIVE**

The Applicant Preferred Alternative – ASB Setback Levee Alternative consists of constructing and maintaining a new approximately 5.7-mile-long setback levee, removing all or portions of the existing levee, and related activities along the Feather River left bank levee from PLM 17.2 to PLM 23.4 (from approximately Star Bend upstream to near Shanghai Bend, southwest of the Yuba County Airport). This area is identified as Segment 2 in the FRLRP (see Figure 2-1). Implementation of the Applicant Preferred Alternative would require the fill of segments of irrigation canals that constitute waters of the U.S. Consequently, TRLIA’s implementation of the Applicant Preferred Alternative would require the issuance of a Section 404 permit by the Corps. Additionally, tying the setback levee into the existing Feather River left bank levee would require Corps permission for alteration of a Federal Project levee.

Figure 2-1 shows the locations of the proposed activities. The intended outcome of the Applicant Preferred Alternative is to provide a setback levee in Segment 2 that meets the engineering and design standards of the Central Valley Flood Protection Board (CVFPB) and the Corps as well as FEMA geotechnical requirements for through-seepage and underseepage at the water surface elevation for the 200-year flood event.

Seepage analysis of the levee foundation is based on the assumption that steady-state conditions have developed for the peak stage of the design flood event, a conservative assumption. The analysis computes the distribution of hydraulic heads within the levee foundation, both in the pervious strata as well as in the less pervious upper stratum on which the levee is founded. The need for seepage control measures is triggered by (1) an uplift gradient (defined as the difference in hydraulic head across the less pervious upper layer divided by the layer’s thickness) in excess of 0.5, and/or (2) an exit gradient in excess of 0.5, both computed with water at the design water surface elevation, and the levee crown (zero-freeboard case). The limit value of 0.5 is used with appropriate levels of geotechnical data and provisions for adequate future monitoring, maintenance, and flood-fighting capabilities. Existing hydraulic gradients in Segment 2 are calculated to range from 0.4 to over 1.0, and are estimated to be in excess of 1.0 in the vicinity of Pump Station No. 3 (GEI Consultants 2006a, 2006b). The purpose of a slurry cutoff wall is to control the hydraulic gradient in the levee foundation and reduce seepage quantities. The proposed levee design, which includes a cutoff wall, allows a maximum hydraulic gradient of 0.5 at the landside toe of the levee.

Degradation of the existing levee after the setback levee is complete would widen the Feather River flow channel within the project area and provide flood protection benefits to areas upstream of the project site.

The Applicant Preferred Alternative would be completed in two stages. Stage 1 of the Applicant Preferred Alternative includes construction of the setback levee and associated stability berms, construction of a new Pump Station No. 3 and associated facilities, filling of the Plumas Lake Canal on the water side from the setback levee to where the canal opens into the ponded area and on the land side from the setback levee to the new Pump Station No. 3; excavation of material within borrow sites (within the setback area and on the land side of the setback levee), and removal, replacement, or relocation of existing utilities and structures within the setback area. Stage 2 of the project includes degradation of all or portions of the existing Feather River left bank levee within Segment 2; decommissioning of the existing Pump Station No. 3; and recontouring portions of the levee setback area and an existing drainage to facilitate drainage of water from the levee setback area toward the Feather River after flood events. Existing ditches and canals would also be used to drain the setback area.

TRLIA is also discussing the feasibility of active restoration in the setback area with the various landowners and stakeholders in the setback area and with the various regulatory agencies. If restoration were conducted, it would be part of Stage 2. Balanced with the potential for habitat restoration in the setback area is TRLIA's commitment to maintain as much of the setback area in agriculture as economically feasible, subject to ensuring public safety. The TRLIA board has adopted a resolution codifying this commitment to maintaining agricultural operations in the setback area, which is provided in Appendix C. Based on the requirements of this resolution and existing information on agricultural operations in the setback area and anticipated construction disturbance, it is reasonable to assume that one-half or more of the roughly 1,045 acres of agricultural lands in the setback area would be retained in agricultural operations. Under these circumstances, up to approximately 525 acres of agricultural land in the setback area would be taken out of agricultural production and converted to habitat. Of the 525 acres, approximately 40 acres would be held under a permanent conservation easement for planting of elderberry shrubs (both relocated shrubs and seedlings) and associated riparian species to compensate for elderberry shrubs that would be moved out of the project construction area, in accordance with U.S. Fish and Wildlife Service (USFWS) requirements. (See Section 3.7, "Terrestrial Biological Resources," and Section 3.9, "Special-Status Biological Resources," for a description of elderberry shrubs that would be affected.)

## **Stage 1 Construction**

### ***Setback Levee Construction***

The setback levee would be approximately 5.7 miles long. The new levee segment would generally be set back approximately 0.5 mile to the east of the existing Feather River levee, except near the northern and southern ends, where it would join the existing levee (Figure 2-1). The Applicant Preferred Alternative – ASB Setback Levee Alternative has the same setback levee alignment as Alternative 2 in the FRLRP EIR except for several minor alignment shifts at the north end, to the east near Country Club Avenue, and to the west near Anderson Avenue. These alignment adjustments were made during the detailed design process based on coordination with local landowners, DWR, the CVFPB, and the Corps. The area between the existing levee and the setback levee alignment (the levee setback area) and the footprint of the setback levee (including access corridors and a land side drainage ditch) would include approximately 1,600 acres.

It is anticipated that the design crown elevation of the setback levee would be the same as the existing levee at each given latitude along the alignment. The height of the setback levee would generally range from about 20 to 30 feet above the existing ground surface. The most common levee height above the adjacent land would be approximately 25 feet. The existing levee has been reconstructed by the Corps to provide a minimum of 3 feet of freeboard above the 1957 design profile. Because the levee setback would lower most flow profiles by widening the flow channel, it follows that the setback levee, if constructed to the crown elevations described above, would also have at least 3 feet of freeboard above the 1957 design profile. Other anticipated dimensions of the setback levee are: a crown width of 20 feet; a footprint width (levee toe to levee toe) of approximately 170 feet



(depending on levee height); levee slopes at a 3:1 ratio (H:V); and a 12-foot-wide patrol road on levee crown. Along both the land and waterside toes of the levee a 50-foot access corridor would be provided to support levee maintenance and inspection and flood fighting activities. Adjacent to the landside access corridor, a drainage ditch would be constructed to intercept and stormwater flows moving toward the levee and transport them to the new Pump Station No. 3. The drainage ditch would be sized to meet flow demands. An approximately 65-foot wide utility corridor would be provided east of the landside access corridor to accommodate the drainage ditch, a 15-foot-wide maintenance road, and other required utilities. Based on these parameters, the levee right-of-way would typically be up to approximately 335 feet wide.

Construction of the setback levee would include three main design elements: preparation of the levee foundation, construction of slurry cutoff walls for seepage control, and construction of the levee embankment. Preparing the foundation of the setback levee would involve clearing and grubbing of all trees, brush, loose stone, abandoned structures, existing utilities, buried pipelines, and other deleterious materials that may exist within the levee right-of-way. After clearing and grubbing, the setback levee foundation would be stripped to remove low-growing vegetation and topsoil to a depth of at least 6 inches, although local areas with extensive tree roots or deep organic soils may require excavation to a depth of 3 feet or greater. The topsoil would be placed in a designated “unsuitable material” spoil area and/or used for borrow area reclamation. Topsoil would also be provided to local farmers for incorporation into their land to improve soil conditions (see Section 3.1.3, “Mitigation,” in the analysis of land use impacts). Overall, the depth of stripping is expected to average about 1–3 feet. Construction of slurry cutoff walls is proposed along substantial portions of the setback levee where widespread strata of permeable sands and gravels exist at varying depths in the foundation. The purpose of the slurry cutoff walls is to dissipate the hydraulic gradient in the levee foundation and reduce seepage quantities. To achieve maximum effectiveness, the slurry cutoff walls must extend completely through the permeable strata before terminating some distance into an underlying, reasonably continuous layer with lower permeability. The slurry cutoff walls would be composed of a mixture of soil and bentonite clay and would extend from 50 to 75 feet deep. Finally, construction of the setback levee embankment would begin as soon as sufficient lengths of levee foundation are complete and weather conditions allow. The embankment would be constructed as an engineered fill, with the fill placed in horizontal lifts. Each lift would be moisture conditioned and compacted to the specified density using a suitable compactor, such as a sheepsfoot, tamping-foot, or rubber-tired roller.

Stability berms integral to the levee embankment would be provided in portions of the southern alignment and between Plumas Avenue and Ella Avenue where the foundation of the levee contains soft clay and silt deposits. Berms would be constructed as an engineered fill, with the fill placed in horizontal lifts consistent with the requirements for lift thickness and compaction densities specified in the Corps Engineer Manual (EM) No. 1110-2-1913 (U.S. Army Corps of Engineers 2000) and in the 23 California Code of Regulations (CCR) Section 120. Each lift would be moisture conditioned and compacted to the specified density using a suitable compactor, such as a sheepsfoot, tamping-foot, or rubber-tired roller. In addition, the landside drainage ditch would be excavated in the 65-foot wide utility corridor to sufficient depths and widths to meet flow demands in each particular area.

### ***New Pump Station No. 3***

A replacement for Pump Station No. 3 would be installed on the land side of the setback levee, and the existing pump station would be removed. The current location of Pump Station No. 3 experiences excessive seepage and boils during high-water events, making it desirable to relocate the pump station out of this area. In addition, after the setback levee is complete, the existing Pump Station No. 3 would be in the setback area and exposed to flooding after the existing levee is degraded. Therefore, as part of Stage 1 of the Applicant Preferred Alternative – ASB Setback Levee Alternative, a new/replacement Pump Station No. 3 would be constructed on the land side of the setback levee, followed by removal of the existing pump station in Stage 2. The location of the new pump station would be adjacent to the Plumas Lake Canal, south of Rich Road (Figure 2-1). The new Pump Station No. 3 would be a reinforced-concrete structure similar to the recently constructed Pump Station No. 2 and Pump Station No. 6 in RD 784. The detailed design plans for the new pump station show a discharge capacity of 52 cubic feet per second (cfs), which is equal to the design capacity of the current pump station. This is the

capacity necessary to accommodate high-water events without the threat of upstream flooding. Once the new Pump Station No. 3 is built, an “approach channel” would be excavated to connect the pump station to the Plumas Lake Canal.

### ***Utility Relocation, Replacement, and Structure Removal***

Implementation of the Applicant Preferred Alternative – ASB Setback Levee Alternative would necessitate the removal of all structures (houses, trailers, sheds, barns, and other agricultural buildings) from the levee setback area, which would be subject to periodic flooding following removal of the existing levee. Approximately 20 structures in the levee setback area would be displaced by the project, including five residential dwelling units. Some utilities and other facilities located in the levee setback area would be relocated or reinforced with implementation of the levee setback. As discussed previously, Pump Station No. 3 would be relocated to the land side of the proposed setback levee.

A Pacific Gas & Electric Company (PG&E) 115-kilovolt (kV) transmission line called the Bogue Loop crosses the levee setback area in an east-west direction and continues into Sutter County west of the project area (Figure 2-1). Within the FRLRP project area, the Bogue Loop is supported by lattice steel poles (LSPs) and four-legged lattice steel towers. In response to the FRLRP, PG&E plans to replace four towers that are located within the expanded floodway, as well as three towers that are located east of the setback levee alignment. The replacement towers in the setback area floodway will have foundations rated to withstand the stresses of occasional flooding. To maintain the electrical lines a minimum distance above the top of the new setback levee, replacement towers would be from 17 to 25.5 feet taller than the existing structures (raised to a total height of approximately 110–120 feet). The one four-legged tower immediately east of the existing levee would be replaced with a tower that is approximately 15 feet taller than the other replacement towers. Replacement towers would be placed a short distance east or west of the existing towers within the same utility alignment as the existing towers. Because the transmission line cannot be taken out of service, temporary wooden transmission towers would be constructed to hold the transmission lines while the existing towers are removed and new towers are constructed. There would be one set of temporary towers on each side of the current alignment, each carrying one of the two existing transmission line circuits. Once the new towers are constructed, the transmission wires would be attached to the new structures and the temporary towers, as well as the existing LSPs and four-legged lattice steel towers, would be removed. All work related to replacement of the Bogue Loop towers will be performed by PG&E and completed in 2009. PG&E’s work would be coordinated with construction of the setback levee.

Other existing facilities that may need to be abandoned, reinforced, or relocated include roads, power distribution lines, irrigation pipelines, drainage ditches, wells, fill stations (facilities where well water is used to fill water tanks), and communications lines. Several private irrigation lines would be cut off by the construction of the setback levee, separating some lands on both sides of the setback levee that require irrigation from current water sources. The wells within the setback area may be retained to support continuing agricultural activities or potential environmental enhancement activities for several years after setback levee construction, or be destroyed in accordance with California’s water well regulations. Wells and fill stations in the levee setback area that are abandoned, would be removed and filled, and new wells would be dug and fill stations built outside the levee setback area to replace the abandoned facilities, as appropriate. Wells and fill stations that would be retained in the levee setback area would be retrofitted to accommodate periodic flooding. New power lines and power poles may be required for any new wells and fill stations.

### ***Borrow Areas***

Borrow material would be obtained locally from borrow areas developed inside and outside the levee setback area. It is estimated that a total of approximately 3.6 million cubic yards (cu. yd.) of compacted borrow material would be required for the Applicant Preferred Alternative – ASB Setback Levee Alternative and that borrow areas would be excavated to depths of about 5–10 feet.

Two general objectives are important in the selection of borrow areas: to minimize haul distances to the setback levee alignment and provide a continuous or nearly continuous borrow source, and to reduce the potential for seepage impacts at the foundation of the setback levee. Minimizing haul distances is important to minimize project construction costs, air emissions, and traffic impacts. To reduce the potential for seepage impacts at the foundation of the setback levee, a distance of 400 feet or greater from the edge of the borrow area to the toe of the proposed levee must be maintained unless there is an incised drainage channel between the setback levee alignment and the borrow area. If such an incised drainage exists, borrow excavation closer to the levee may be allowed, based on an evaluation of local site conditions such as soil permeability. Borrow areas may also be developed closer than 400 feet from the toe of the setback levee if the borrow pit is to be subsequently backfilled.

Prior to excavation of the borrow areas, the topsoil would be stripped to a depth of approximately 6 to 12 inches and stockpiled on an unused area within the borrow area site. Wide, shallow excavations (rather than deep trenches) are anticipated. Following removal of the borrow material, the stockpiled soil could be placed in the bottom of the borrow pit from which it was removed, or used for borrow area reclamation after the pit has been filled or partially filled with soil from the degraded levee (during Stage 2). Depending on contractor operations, some of the stockpiled topsoil could be placed in the setback levee spoil berm. The reclaimed borrow areas would be graded to blend with the topography, leaving slopes flat enough to reduce erosion and promote conditions conducive to vegetative growth (slopes 3:1 [H:V] or flatter). The bottom of the reclaimed borrow areas would be graded to drain away from the levee and toward the river or toward existing drainage ways. The drainage of any borrow areas in the levee setback area would also need to ensure fish movement out of the levee setback area into the main channel of the Feather River when flood flows recede following inundating flood events. The borrow areas would be revegetated to conform to the surrounding landscape. The borrow sites would be reclaimed as appropriate. Some stockpiled topsoil, and other excess earth materials (organic soils, roots, and grass) from borrow areas and the setback levee foundation could be spread over borrow sites after excavation has been completed. An exception to the above standards is the borrow site just north of Ella Road and east of Feather River Boulevard (Figure 2-1). This site, identified as the Ella Road borrow area, is adjacent to an existing stormwater detention basin. Once use of the borrow site is complete, it would not be refilled, but would be connected to the existing detention basin to expand the capacity of the basin.

Detailed investigations of borrow areas have involved excavation of test pits and analysis of soil borings to identify suitable sources for levee embankment materials. The location and limits of borrow areas will continue to be refined as a result of this effort. Other criteria for selecting borrow sites include right-of-way access, distance to the setback levee alignment, and environmental resources locations. Borrow sites are either not being considered for areas where such use could adversely affect sensitive species, waters of the U.S, or hazardous materials, or mitigation is provided for impacts to these resources as described in Chapter 3.0 of this FEIS, "Affected Environment and Environmental Effects." Borrow sites would be located in upland areas and materials taken from the borrow sites would not consist of hydric soils. Table 2-1 lists the local borrow areas being considered, which are also shown in Figure 2-1. Based on the results of geotechnical investigations, these sites would yield sufficient soil to construct the Applicant Preferred Alternative or the other action alternatives. Imported material would include approximately 9,000 cu. yd. of filter sand, 9,000 cu. yd. of drain gravel, and 14,000 cu. yd. of Class 2 aggregate. Necessary aggregate base and rock revetment material would be obtained from a commercial sand and gravel operation located along the Yuba River, most likely either Western Aggregates near the Yuba Goldfields or the Parks Bar Quarry operated by Nordic Industries. The construction contractor would select the supplier based on suitability of material and pricing.

### ***Fill of Portions of the Plumas Lake Canal***

The new setback levee would divide the Plumas Lake Canal with portions of the canal remaining intact on either side of the setback levee (see Figure 2-1, as well as the Section 404 Individual Permit Application for Segment 2, Exhibit 4 in Attachment C, provided in Appendix B). To minimize potential for underseepage that could result from having an excavated feature too close to the levee, approximately 490 feet of the canal on the west (water) side of the setback levee would be completely filled (from the west side of the setback levee alignment to where

the canal opens into the ponded section of the Plumas Lake Canal). Approximately 2,200 feet of canal on the east (land) side of the setback levee would be filled between the new Pump Station No. 3 and the setback levee alignment. An approximately 2-foot-deep ditch would remain along the canal alignment to drain surface runoff from landside areas at the southern end of the setback levee to the new Pump Station No. 3.

**Table 2-1  
Maximum Estimated Quantities of Soil Borrow**

| Potential Borrow Area                                                                                                                                                                         | Approximate Total Acreage                                                             | Approximate Depth of Excavation | Estimated Total Cubic Yards (cu. yd.) of Material |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|---------------------------------------------------|
| Northwest borrow area, within the levee setback area (primary borrow source)                                                                                                                  | 350 acres                                                                             | 5–10 feet                       | Up to 2.7 million cu. yd.                         |
| Northeast borrow area (north of Anderson Avenue near the setback levee alignment)                                                                                                             | 22 acres                                                                              | 5–10 feet                       | Up to 0.2 million cu. yd.                         |
| Eastern borrow area (east side of Feather River Boulevard)                                                                                                                                    | 125 acres, with the remainder of the site (approximately 85 acres) to be undisturbed) | 5–10 feet                       | Up to 1.2 million cu. yd.                         |
| Ella Avenue borrow area (north side of Ella Avenue)                                                                                                                                           | 18 acres                                                                              | 22 feet                         | Up to 0.7 million cu. yd.                         |
| <b>Total Potentially Available Soil Borrow</b>                                                                                                                                                |                                                                                       |                                 | <b>Approximately 4.8 million cu. yd.</b>          |
| Note: Additional acreage within the eastern borrow area above the 125 acres specified may become available before all necessary borrow material has been extracted from the identified sites. |                                                                                       |                                 |                                                   |

## Stage 2 Construction

### ***Decommission of Existing Pump Station No. 3***

After the construction of the setback levee and Pump Station No. 3, the existing Pump Station No. 3 would continue to operate until the existing levee is degraded. At that time, the existing Pump Station No. 3 would be decommissioned and removed.

### ***Setback Area Drainage Swale***

A floodplain drainage swale would be constructed along the alignment of the existing Pump Station No. 3 discharge channel from the existing Pump Station No. 3 location to the Feather River. This drainage swale would connect the setback area lowlands to the Feather River and the existing channel would be enlarged and deepened to accommodate flood flows leaving the setback area to minimize the potential for fish stranding as flood waters recede. The setback area drainage swale would be constructed in a manner that minimizes vegetation disturbance, fish stranding, and other environmental impacts. A site-specific drainage plan for the entire setback area would be developed in final design.

The setback area drainage swale would also act to allow backwater to flow into the setback area from the Feather River, increasing the inundation frequency of portions of the setback area and the quality of the aquatic habitat. It is estimated that the 31-foot stage would be inundated in 2 out of every 3 years for a period of at least 1 week between March 15 and May 15. Floodplain land at or below this elevation would provide a broad suite of valuable ecosystem functions, including provision of nutrients and seasonal habitat for aquatic species.

## ***Degradation of Existing Levee***

All or portions of the existing Segment 2 levee would be removed to achieve the maximum hydraulic benefits of the levee setback by allowing water to flow into and out of the levee setback area during high river stages. Where the existing levee would be excavated to allow flood waters to pass into and out of the levee setback area, the existing embankment would be excavated to the level of the adjoining ground surface in the levee access corridor. Any slurry cutoff walls within the embankment would also be removed to the level of the adjoining ground surface. If any specific sections were to be retained, it would be determined in final project design and would be based on factors that include the need for soil to backfill project borrow sites and possible mitigation value for project impacts on sensitive species. Any sections of the existing levee that are left in place would not be maintained. There are no plans to use material from the existing Feather River left bank levee as borrow material for the new setback levee. However, as discussed above, material from the existing levee would be used to reclaim soil borrow sites developed during construction of the setback levee. It is expected that for some period of time, the existing levee and the new setback levee would be in place concurrently. During this period, the setback levee would function as a “backup” levee, providing a second line of increased levee protection if the existing levee in Segment 2 were to breach during a flood event.

## **Other Associated Activities (Stages 1 and 2)**

### ***Staging Areas and Access Routes***

It is anticipated that several staging areas would be developed along the setback levee alignment to allow for efficient use and distribution of materials and equipment. Staging areas, including parking for construction workers, would be located within the construction corridor and near active construction areas, so they may be relocated as construction progresses. Because the work area is essentially flat, suitable sites for construction staging are abundant. Final staging area selection would be based on contractor preference and environmental and land use constraints. All proposed staging areas will be surveyed for sensitive environmental resources before use (e.g., cultural resources, special-status species, wetlands and waters of the U.S.) and staging areas will not be placed in locations where sensitive resources are present. Because staging areas are anticipated to be located primarily within the proposed project footprint, environmental resources surveys have already been completed in most locations that would be considered for staging areas. Personnel, equipment, and imported materials would reach the project site via State Route (SR) 70 and Feather River Boulevard. At the project site, the primary construction corridor would include the setback levee alignment, soil borrow areas, and roads used for access to the work areas, including Feather River Boulevard. Access roads would consist mainly of the existing east-west lateral roads between SR 70, Feather River Boulevard, and the levee setback area. If any new access routes are created during project construction, they would be subject to the same survey and avoidance criteria described above for staging areas.

### ***Disposal of Excess Materials***

Excess earth materials (organic soils, roots, and grass from borrow areas and the setback levee foundation; excavated material that does not meet levee embankment criteria; and soil not used or not suitable for the cutoff wall) would be used in the reclamation of borrow areas, provided to local farmers for incorporation into their land to improve soil quality (see Section 3.1.3, “Mitigation” in the analysis of Land Use impacts), or would be placed in a surplus material berm at the waterside toe of the setback levee. In addition, excess material could be used in the contouring of the setback area to facilitate drainage to the Feather River and prevent fish stranding. Cleared vegetation (i.e., trees, brush) would be hauled off-site. Debris from structure demolition, power poles, piping, and other materials requiring disposal would be hauled off-site to a suitable landfill.

## Construction Equipment

Contractor plant equipment would include construction office and equipment trailers; slurry batch plants, including bentonite storage facilities, mixing tanks, pumps, and piping; warehousing and equipment maintenance facilities; and fuel pumps, and fuel storage tanks.

Mobile equipment for proposed levee activities is assumed to include the following typical equipment:

- ▶ two hydraulic excavators,
- ▶ two long-stick hydraulic excavators,
- ▶ two utility excavators,
- ▶ eight to 10 scrapers,
- ▶ four bulldozers,
- ▶ two low-ground pressure bulldozers,
- ▶ three to four graders,
- ▶ four self-propelled sheepsfoot or tramping-foot rollers,
- ▶ two water wagons,
- ▶ 20 highway dump trucks,
- ▶ a lubricating truck,
- ▶ a front-end loader,
- ▶ a truck-mounted crane,
- ▶ three integrated tool carriers, and
- ▶ numerous pickup trucks.

Additional equipment would include drill rigs to abandon wells and install new wells, utility equipment to install power lines, air compressors to operate tools and other equipment, welding equipment, pumps and piping, communications and safety equipment, erosion control materials, miscellaneous equipment customary to the mechanical and electrical crafts, and vehicles used to deliver and move equipment, materials, and personnel.

## Construction-Related Traffic

Personnel, equipment, and imported materials would reach the project site via SR 70 and Feather River Boulevard, which are paved, all-weather roads, and suitable for the anticipated loads. The construction labor force is estimated to average about 60–70 persons over the 20-month construction period. Peak staffing could be close to 100 depending on the contractor's schedule.

It is expected that about 40 trailer ("low-boy") truck round trips would be required to transport the contractor's plant and equipment listed above to the site. A similar number of round trips would be needed to remove the equipment from the site as the work is completed.

Necessary aggregate base and rock revetment material would be obtained from a commercial sand and gravel operation located in the Yuba City-Marysville area. Both sites are located within approximately 20 miles of the FRLRP levee setback area. The construction contractor would select the specific supplier based on suitability of material and pricing. About 2,000 highway truck trips would be needed to bring the aggregate base and rock revetment material to the site from the quarry of origin. About 300 truckloads would be needed to bring dry bentonite to the site. The bentonite would probably be processed in Wyoming or South Dakota and transported to the Marysville–Yuba City area by rail. About 20 trailer truckloads would be required to bring other permanent materials to the site, such as geotextile fabric, erosion control materials, structural steel, piping, utility poles, well casings, and ancillary equipment. About 100 concrete loads, transported by transit mixer truck, are also likely. In addition, about 650 highway truckloads may be needed to carry demolition debris, construction debris, and waste materials to a suitable landfill.

Within the construction areas, the main sources of construction traffic would be the required transport of borrow material for setback levee construction, and later, the transport of material from the existing levee to fill borrow sites during levee degradation. Transport of an estimated 3.6 million cu. yd. of borrow material would require approximately 180,000 haul trips if a load of 20 cu. yd. per trip is assumed. Larger haul unit sizes would reduce the number of trips and impacts on air quality. Approximately 150,000 haul trips would be required to move an estimated 3.0 million cu. yd. of material during levee degradation. Dust control measures would be applied to roads and work areas on a systematic basis.

## Construction Scheduling

A period of up 20–28 months would be required for construction of the Applicant Preferred Alternative – ASB Setback Levee Alternative depending on a variety of factors. TRLIA has developed a construction schedule that would allow for completion of the Segment 2 setback levee by the end of 2008 and for the entire project to be completed before the beginning of the 2009/2010 flood season. This schedule requires the initiation of project activities (e.g., contractor mobilization) in spring 2008. Corps decisions about whether to grant the requested permissions to TRLIA under Clean Water Act (CWA) Section 404 and Section 14 of the Rivers and Harbors Act of 1899 (i.e., "Section 408") are expected to be made in November 2008. Work that is planned to begin earlier in 2008 would involve activities at locations that would not be subject to Section 404 permitting or Section 408 permission. Construction that would be undertaken based on the planned schedule would be in compliance with all other applicable laws and regulations (e.g., authorization for incidental take under the federal Endangered Species Act) during all construction activities, regardless of the schedule for Corps decisions on the project. TRLIA recognizes that this approach carries the risk that the Corps permissions may not be granted as requested or may not be granted according to the timing assumed in the schedule, and has proposed to assume this risk rather than delay the start of construction until fall 2008, completion of setback levee construction until 2009, and project completion until 2010.

Environmental resource areas requiring federal authorizations are shown on Figure 2-2. The areas depicted on Figure 2-2 include waters of the U.S. that would be permanently affected by the project, other sensitive resource areas along the setback levee alignment, and the existing levee and tie-ins to the proposed setback levee. The areas along the setback levee alignment requiring federal authorization extend from the south levee tie-in to Station 3+00, Station 18+00 to Station 21+00, Station 93+00 to Station 104+00, Station 239+00 to Station 254+00, and Station 285+30 to the north tie-in. No work would be initiated on the existing Feather River levee or at the levee tie-ins before Section 408 authorization is granted. In December 2007, the National Marine Fisheries Service (NMFS) provided a letter to the Corps determining that the Applicant Preferred Alternative – ASB Setback Levee Alternative is not likely to adversely affect species under NMFS' jurisdiction that might occur in the project area. NMFS also concluded that the Applicant Preferred Alternative would not adversely affect Essential Fish Habitat for Pacific salmon. With issuance of the USFWS final Biological Opinion on August 28, 2008, consultation under Section 7 of the federal Endangered Species Act (ESA) has been completed. With execution of the Memorandum of Agreement between the Corps, TRLIA, and the State Historic Preservation Officer on July 22, 2008, consultation under Section 106 of the National Historic Preservation Act (NHPA) was also completed. Refer to Chapter 6.0, "Consultation and Coordination," for details on the status of consultations under Section 106 of the NHPA and Section 7 of the ESA. These consultations are components of the Section 404 permit action. Construction work is being planned to avoid resource areas subject to Corps approvals. Measures have been planned for implementation by TRLIA and TRLIA's contractors to ensure avoidance of the areas shown on Figure 2-2, as follows:

- ▶ Limits of allowable work/construction areas will be clearly demarcated on design drawings.
- ▶ Exclusion zone barriers (e.g., orange construction fencing) will be installed around sensitive resource areas according to the directions of the project engineers and a qualified biologist when construction activities would occur within 200 feet of an area where construction is not authorized.

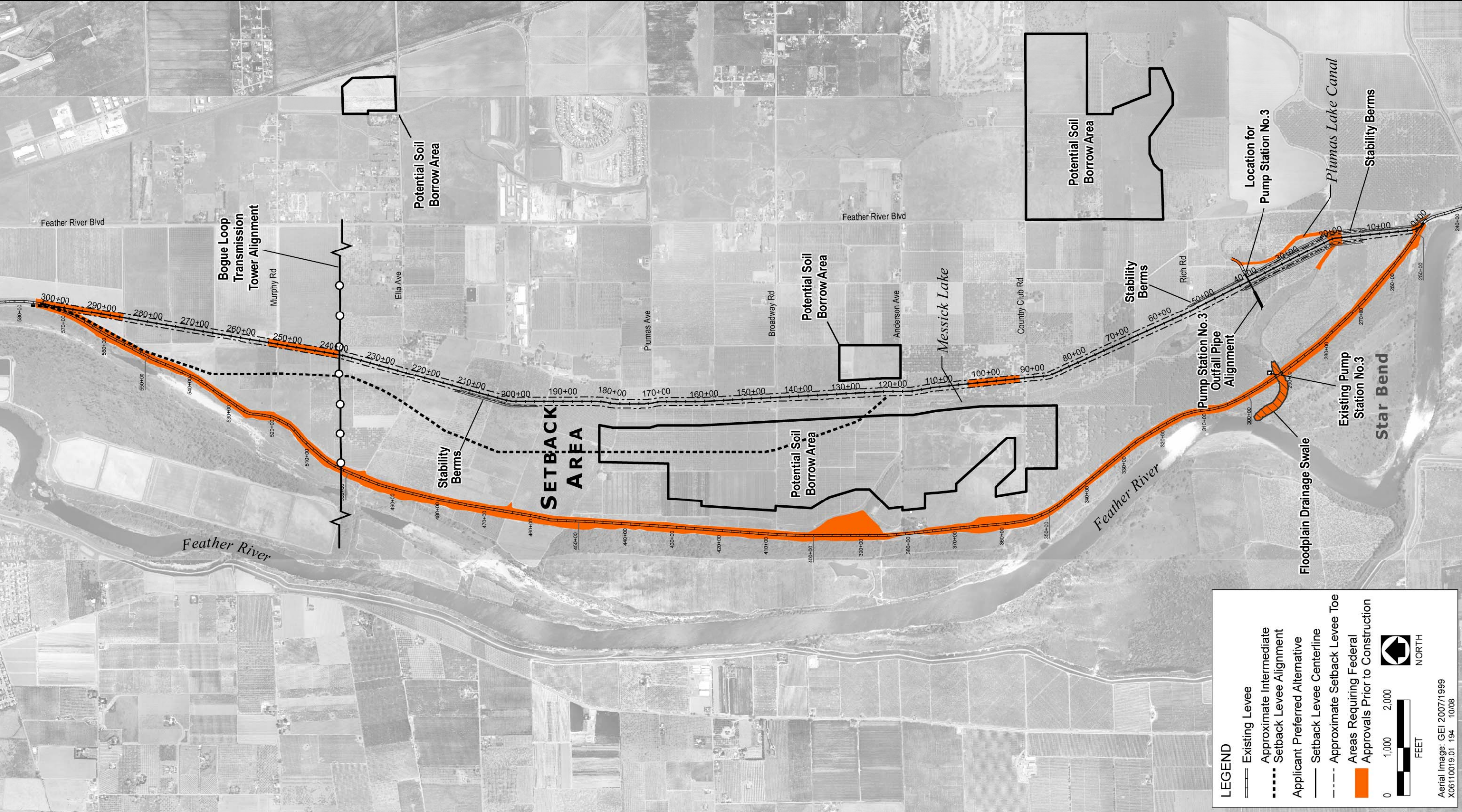
- Biological monitors will work closely with construction personnel to ensure protection of identified exclusion areas.

Table 2-2 shows the anticipated timing of the construction activities for both project stages based on receipt of federal authorizations in November 2008 and other assumptions described above. TRLIA has planned for a more aggressive schedule allowing construction to be completed in approximately 20 months; however, the schedule shown in Table 2-2 reflects the Corps' indicated timeline for federal authorizations. The schedule assumes that contractor mobilization would begin in May 2008 and construction activity would begin in June 2008 in areas and on activities not requiring Corps permissions, that construction would be initiated in November 2008 in areas requiring Corps permissions, construction of the setback levee embankment would be completed at the end of June 2009, and removal of the existing levee would begin in August 2009. Demobilization periods are planned for the winter seasons of 2008–2009 and 2009–2010. It is assumed that active construction work would be reduced during the demobilization/winterization periods, depending on weather conditions. Final clean-up and contractor demobilization would occur in late summer 2010. A description of the project activities by stage is provided below.

### ***Stage 1 Construction Activities***

- Mobilization: Mobilization would include setting up construction offices, transporting heavy earthmoving equipment to the site, and establishing staging areas. Areas requiring federal approvals would be identified and marked. These activities may take about 1 month.
- Levee Foundation Preparation: This activity would begin soon after mobilization. Construction will take a total of approximately 7 months depending on the amount of equipment working simultaneously, weather conditions, and permit requirements.
- Slurry Cutoff Wall Construction: Installation of slurry cutoff walls along the setback levee alignment would occur simultaneously with levee foundation preparation.
- Levee Embankment Construction (including stability berms): Because the setback levee alignment is nearly 6 miles long, levee embankment construction could begin in some areas while foundation preparation is underway along other portions of the alignment. Levee embankment construction is anticipated to take a total of approximately 9 months and be completed in the summer of 2009.
- Borrow Material Excavation: Excavation of borrow materials for use in the construction of the setback levee embankment could begin simultaneously with levee foundation preparation or slurry wall construction and would occur for the duration of levee embankment construction.
- Tie-ins to Existing Levees: Elements of tying in the setback levee to the existing levees would take place during levee foundation preparation, levee embankment construction, and potentially during slurry cutoff wall construction.
- Pump Station No. 3 Construction: Construction of the new Pump Station No. 3 would occur concurrently with levee embankment construction. Procurement of long-lead items (e.g., pumps, motors, valves, and generator) could begin several months before they would be needed.
- Filling of Plumas Lake Canal: Plumas Lake Canal would be filled between Pump Station No. 3 and the lake-like feature west of the setback levee in 2009 based on the assumed schedule for receipt of 408 and 404 authorizations.
- Demobilization and Other Activities: Various demobilization activities would take place through the two winters, such as removal of equipment and materials not needed for the Stage 2 construction effort; disposal





Source: Data provided by GEI Consultants in 2008

Areas Requiring Federal Approvals Prior to Construction

Figure 2-2



**Table 2-2  
Segment 2 Construction Schedule<sup>1</sup>**

| Construction Activities                   | 2008 |    |    |    |    |    |    |    |    |    | 2009 |    |    |    |    |    |    |    |    |    |    |    | 2010 |    |    |    |    |    |    |    |
|-------------------------------------------|------|----|----|----|----|----|----|----|----|----|------|----|----|----|----|----|----|----|----|----|----|----|------|----|----|----|----|----|----|----|
|                                           | Ap   | Ma | Jn | Ju | Au | Se | Oc | No | De | Ja | Fb   | Mr | Ap | Ma | Jn | Ju | Au | Se | Oc | No | De | Ja | Fb   | Mr | Ap | Ma | Jn | Ju | Au | Se |
| <b>Stage 1</b>                            |      |    |    |    |    |    |    |    |    |    |      |    |    |    |    |    |    |    |    |    |    |    |      |    |    |    |    |    |    |    |
| Mobilization                              |      |    |    |    |    |    |    |    |    |    |      |    |    |    |    |    |    |    |    |    |    |    |      |    |    |    |    |    |    |    |
| Levee Foundation Preparation              |      |    |    |    |    |    |    |    |    |    |      |    |    |    |    |    |    |    |    |    |    |    |      |    |    |    |    |    |    |    |
| Slurry Cutoff Wall Construction           |      |    |    |    |    |    |    |    |    |    |      |    |    |    |    |    |    |    |    |    |    |    |      |    |    |    |    |    |    |    |
| Levee Embankment Construction             |      |    |    |    |    |    |    |    |    |    |      |    |    |    |    |    |    |    |    |    |    |    |      |    |    |    |    |    |    |    |
| Borrow Material Excavation                |      |    |    |    |    |    |    |    |    |    |      |    |    |    |    |    |    |    |    |    |    |    |      |    |    |    |    |    |    |    |
| Tie-ins to Existing Levees                |      |    |    |    |    |    |    |    |    |    |      |    |    |    |    |    |    |    |    |    |    |    |      |    |    |    |    |    |    |    |
| Construct New Pump Station #3             |      |    |    |    |    |    |    |    |    |    |      |    |    |    |    |    |    |    |    |    |    |    |      |    |    |    |    |    |    |    |
| Fill of Plumas Lake Canal                 |      |    |    |    |    |    |    |    |    |    |      |    |    |    |    |    |    |    |    |    |    |    |      |    |    |    |    |    |    |    |
| Demobilization/Winterization              |      |    |    |    |    |    |    |    |    |    |      |    |    |    |    |    |    |    |    |    |    |    |      |    |    |    |    |    |    |    |
| <b>Stage 2</b>                            |      |    |    |    |    |    |    |    |    |    |      |    |    |    |    |    |    |    |    |    |    |    |      |    |    |    |    |    |    |    |
| Demobilization/Winterization              |      |    |    |    |    |    |    |    |    |    |      |    |    |    |    |    |    |    |    |    |    |    |      |    |    |    |    |    |    |    |
| Removal of Existing Levee                 |      |    |    |    |    |    |    |    |    |    |      |    |    |    |    |    |    |    |    |    |    |    |      |    |    |    |    |    |    |    |
| Decommission Pump Station #3 <sup>2</sup> |      |    |    |    |    |    |    |    |    |    |      |    |    |    |    |    |    |    |    |    |    |    |      |    |    |    |    |    |    |    |
| Floodplain Drainage Swale <sup>3</sup>    |      |    |    |    |    |    |    |    |    |    |      |    |    |    |    |    |    |    |    |    |    |    |      |    |    |    |    |    |    |    |
| Borrow Area Reclamation                   |      |    |    |    |    |    |    |    |    |    |      |    |    |    |    |    |    |    |    |    |    |    |      |    |    |    |    |    |    |    |
| Demobilization                            |      |    |    |    |    |    |    |    |    |    |      |    |    |    |    |    |    |    |    |    |    |    |      |    |    |    |    |    |    |    |

Notes: Blue denotes construction activities in areas that are not subject to federal approvals. Orange denotes construction activities throughout the project area based on the estimated schedule of when federal approvals would be granted (scheduled for the week of November 3, 2008).

A pause in construction is planned for July, 2009 to account for the required authorization to degrade the existing levee following setback levee construction.

<sup>1</sup> Schedule assumes receipt of federal authorizations in early November 2008.

<sup>2</sup> 2 months only within period shown.

<sup>3</sup> 1 month only within period shown.

of excess materials at appropriate facilities; and restoration of staging areas, temporary access roads, and other disturbed areas not needed for Stage 2 construction. Areas included as part of Stage 2 construction (e.g., borrow areas to receive degraded levee soils) would be stabilized and monitored through the winter seasons. Earth moving may occur in the setback area to support appropriate drainage of the area after the existing levee is breached. Erosion control measures would be installed, monitored, and maintained.

### **Stage 2 Construction Activities**

- ▶ **Removal of the Existing Levee and Treatment of the Site 7 Cutoff Wall:** The existing Feather River levee in the setback area would not be removed until the setback levee is complete. The Site 7 cutoff walls do not extend above grade. (Refer to Section 1.7.1, “Corps Flood Protection Projects,” for a description of the Site 7 work). The existing soil-bentonite cutoff wall from PLM 17.2 to 20.3 (from Star Bend north to near Broadway Road) would be exposed and capped with compacted fill during levee degradation operations. The portion of the soil-cement-bentonite cutoff wall at the south end of Segment 2 within the levee prism would be removed with the levee. The remaining portion within the foundation would be at ground level and is expected to be as firm or firmer than the adjacent ground. Removal of the existing levee would take place outside of the identified Feather River flood season. It is expected that levee removal would begin in August 2009. Following the demobilization period that winter, degradation and/or removal of the rest of the levee would be completed during spring and summer of 2010. Construction contractors would implement a grading plan prior to the onset of winter rains that would prevent fish stranding should the setback area flood during that first winter.
- ▶ **Decommission of the Existing Pump Station No. 3:** Removal of the existing pump station would be done concurrent with removal of the existing levee.
- ▶ **Setback Area Drainage Swale:** Grading of the setback area to facilitate drainage of floodwaters back to the Feather River and enhancement of the setback area drainage swale would be conducted concurrent with removal of the existing levee.
- ▶ **Demobilization and Borrow Area Reclamation:** Demobilization would include removal of equipment and materials from the project site; disposal of excess materials at appropriate facilities; and restoration of staging areas, temporary access roads, and other disturbed sites to pre-project conditions. Demobilization activities would likely occur in various locations as construction proceeds along the project alignment, but would be completed in fall/winter 2009 after removal of the existing Feather River levee is complete. After soil borrow areas have been filled with material removed from the existing levee, these sites would need to be stabilized and reclaimed. Final soil contouring, vegetation plantings, and in some cases habitat restoration plantings would take place in the former soil borrow areas. These activities would also occur through the fall and winter of 2009.

### **Hydrology and Flood Control Benefits**

The Applicant Preferred Alternative – ASB Setback Levee Alternative would support and enhance the performance of the current flood control system. With the proposed setback levee in place along the Feather River, upstream reservoirs could continue to operate in the same manner as under current conditions.

The Applicant Preferred Alternative would provide flood control benefits by putting in place a new levee constructed in a more secure location than the existing levee using current engineering standards as well as lowering water levels upstream during flood events once the existing levee is removed. After implementation of the proposed action, FRLRP levee Segment 2 would be more resistant to underseepage, through-seepage, and erosion, and less susceptible to catastrophic breaches.

## Operation and Maintenance

The proposed setback levee would entirely replace the corresponding existing Feather River levee as a project levee in the SRFCP. As is the current practice, landowners would be assessed fees for levee operation and maintenance, which would be performed by RD 784 under the supervision of DWR. There would be no substantial difference between the operation and maintenance of the existing levee and the new setback levee.

If the Applicant Preferred Alternative – ASB Setback Levee Alternative is implemented, TRLIA may acquire land in the setback area through fee-title or obtain flowage easements, or DWR may acquire the land in fee title through the expenditure of bond funds supporting project implementation. Ownership of properties in the levee setback area that are acquired by TRLIA or DWR for project implementation and are not part of the setback levee footprint could be transferred to a resource agency or land conservancy for future management. Special operations and maintenance plans would need to be prepared and implemented to ensure the long-term maintenance of any habitat areas, and to ensure they do not conflict with the flood control function of the levee setback area. Similarly, where lands in the levee setback area are retained in agricultural production, agricultural operations plans would be developed and implemented to ensure that ongoing agricultural activities do not conflict with the flood control function of the levee setback area.

### 2.2.3 INTERMEDIATE SETBACK LEVEE ALTERNATIVE

The Intermediate Setback Levee (ISL) Alternative would involve the construction and maintenance of a new approximately 5.5-mile-long setback levee. This alternative would match the alignment of the Applicant Preferred Alternative – ASB Setback Levee Alternative for approximately 1.6 miles in the south, would then transition to an alignment approximately 1,000 feet (maximum) to the west of the Applicant Preferred Alternative setback levee alignment, then would match the Applicant Preferred Alternative's alignment again at the northern tie-in to the existing levee (Figure 2-1). This setback levee, at approximately 5.5 miles long, would be roughly 0.2 miles shorter than the setback levee under the Applicant Preferred Alternative. Construction of the setback levee in the Applicant Preferred Alternative's alignment would result in approximately 1,300 acres of existing land becoming part of the new Feather River floodway. Construction of the setback levee in the ISL Alternative would result in approximately 1,100 acres of existing land becoming part of the new Feather River floodway. The reason for proposing an intermediate setback levee is to reduce the adverse effects on existing land uses and the extent of acquisition of land rights necessary within the setback area.

The plan for construction of the ISL Alternative would generally be the same as described above for the Applicant Preferred Alternative. Although locations of some project elements would differ, methods of constructing the slurry cutoff wall, foundation preparation, levee embankment construction, utility relocation, removal of the existing levee, relocation of Pump Station No. 3, and other construction elements would be the same. The ISL Alternative would follow the same two stage construction process and construction schedule as the Applicant Preferred Alternative. Like the Applicant Preferred Alternative, it is estimated that under the ISL Alternative, approximately 3.6 million cu. yd. of material would be required for setback levee construction. Although the intermediate setback levee is approximately 0.2 miles shorter than the setback levee for the Applicant Preferred Alternative, the existing ground surface is at a lower elevation along much of the intermediate setback levee alignment. Therefore, more soil is needed to build a levee to the desired height, resulting in the same borrow material needs for both alternatives. Potential borrow areas would be the same as described above for the Applicant Preferred Alternative and would be treated in the same manner. Utility removals, replacements, and relocations would be somewhat less under this alternative due to the reduced size of the setback area. One fewer tower along the PG&E Bogue Loop electrical transmission line would require replacement compared to the Applicant Preferred Alternative. Operation and maintenance of the setback levee and the levee setback area would be the same as described for the Applicant Preferred Alternative.

Hydrologic and flood control benefits under the ISL Alternative would be similar to those described for the Applicant Preferred Alternative, although upstream reductions in flood stage elevations would be less because of the lesser increase in the width of the Feather River flow channel.

## **2.2.4 LEVEE STRENGTHENING ALTERNATIVE**

### **2.2.4.1 OVERVIEW**

This alternative would involve repairs and improvements to the existing Feather River levee along Segment 2. No setback levee would be constructed. Repairs and improvements would consist of construction of slurry walls, installation of relief wells, raising and/or constructing seepage/stability berms at various locations, and correcting identified waterside erosion problem areas. Under this alternative, the existing Pump Station 3 would be removed and a new pump station would be installed farther east of the existing site. Soil borrow areas would be established of sufficient size to support levee repairs.

### **2.2.4.2 GENERAL CONSTRUCTION PLAN**

#### **Slurry Cutoff Wall**

Along much of the existing levee alignment slurry cutoff walls would be constructed to address existing underseepage and throughseepage problems. Construction of the slurry cutoff wall to the depths required along the existing levee would be accomplished with large modified backhoes. This equipment and the associated sequence of excavation, backfill preparation, and placement of backfill back into the slurry cutoff wall trench would require a work platform near the trench. The work platform would be established adjacent to the trench by partially degrading (cutting down) the top of the existing levee to provide adequate working width. The width of the working platform could be minimized if excavated soil were hauled to a nearby mixing area rather than being mixed adjacent to the slurry cutoff wall trench.

The slurry cutoff wall is expected to range between 2.5 and 3 feet wide and would typically range between 50 and 70 feet deep, although the depth could be as much as 80 feet. If the depth of the required slurry cutoff wall exceeds 80 feet, the levee could be degraded in those locations to allow the excavator to reach a deeper level, or the deep soil mixing (DSM) method could be used. Cutoff wall dimensions would be sufficient to meet the hydraulic gradient requirements, design standards of the CVFPB and the Corps, as well as FEMA geotechnical requirements for through-seepage and underseepage. After installation of the slurry cutoff wall, compacted embankment material would be placed to restore the levee height. However, some time would be allowed for the backfill in the slurry cutoff wall to settle before the placement of fill in the overlying embankment would occur. The connection between the slurry cutoff wall and the embankment fill is a key feature and would be refined during detailed design. After the levee is restored, aggregate base would be placed on the levee crown patrol road, similar to existing conditions.

#### **Stability/Seepage Berm Construction**

Stability and/or seepage berms could be used in tandem with, or in lieu of a slurry cutoff wall in select locations. Berms would be constructed as an engineered fill, with the fill placed in horizontal lifts consistent with the requirements for lift thickness and compaction densities specified in the Corps Engineer Manual (EM) No. 1110-2-1913 (U.S. Army Corps of Engineers 2000) and in 23 California Code of Regulations (CCR) Section 120. Each lift would be moisture conditioned and compacted to the specified density using a suitable compactor, such as a sheepfoot, tamping-foot, or rubber-tired roller.

## Erosion Protection

Based on the results of TRLIA's Phase IV Erosion Investigation (MBK Engineers 2006a), five locations have been identified along the existing levee in Segment 2 as erosion problem areas requiring additional erosion protection. Erosion protection activities in these locations are anticipated to consist of the following steps:

1. Clear vegetation, and strip and salvage the surface soil from the work area.
2. Backfill any existing scour features using adjacent native soils. Place and compact the soil in thin lifts to develop a good foundation for cobble fill.
3. Lay a geotextile filter fabric over the area to be protected.
4. Place gravel/cobble fill with an approximate thickness of 1½–2 feet over the geotextile fabric.
5. Place the salvaged original surface soil over the gravel/cobble fill. Also replace any segments of levee maintenance roads that were disturbed.
6. Seed the disturbed area (other than maintenance road alignments) with a seed mix of native grasses that does not include woody vegetation.

Where soil along the waterside or landside surface of the existing Feather River levee is disturbed during project implementation, an approved grass cover would be placed for erosion protection. The same grass cover would be placed on stability berms where they are installed. Historical experience with the existing left bank Feather River levee in this area indicates that grass cover provides acceptable erosion protection against high water levels during flood flows.

## Pump Station No. 3 Relocation

The current location of Pump Station No. 3 experiences excessive seepage and boils during high-water events, making it desirable to relocate the pump station out of this area. As part of the Levee Strengthening Alternative, the existing pump station would be removed and a new/replacement Pump Station No. 3 would be constructed farther to the east adjacent to the Plumas Lake Canal. The exact location would be determined during detailed project design. Equipment and material from the existing pump station would not be reused at the new location.

The new Pump Station No. 3 would be a reinforced-concrete structure similar to the recently constructed Pump Station No. 2 and the new Pump Station No. 6 in RD 784, which was completed in 2006. The segment of existing canal between the current and new locations of Pump Station No. 3 would be backfilled with material of low permeability. Pipelines through the Feather River levee to allow drainage from the new pump station into the river would be designed in accordance with standards of the CVFPB and Corps guidelines.

If relief wells were to be installed as part of this alternative, flows from these wells would be conveyed to the new Pump Station No. 3. The capacity of the new pump station would be increased above the existing capacity of 52 cfs to accommodate the relief well discharge based on the estimated flow rates.

## Borrow Areas

Requirements for borrow material would be substantially less under the Levee Strengthening Alternative than alternatives incorporating a setback levee because the existing levee would be retained and soil for a setback levee would not be necessary. In addition, material excavated from the slurry cutoff wall trenches would be used to the extent practicable, reducing the need for borrow material from off-site sources. However, it is still estimated that a total of approximately 1.4 million cu. yd. of borrow material would be required for levee repair and strengthening activities. Activities requiring borrow would include constructing slurry cutoff walls, correcting erosion problem



areas, and construction of seepage/stability berms. Borrow sites would be developed as needed in areas west of Feather River Boulevard on lands as close as possible to the existing levee to reduce transport distances. Potential sources for borrow material would be the same as those identified in Table 2-1.

As described for the Applicant Preferred Alternative – ASB Setback Levee Alternative, any borrow areas that are developed would be constructed as wide, shallow excavations rather than as deep trenches. At the conclusion of the work, the borrow areas could be graded to blend with the topography, leaving slopes flat enough to reduce erosion and promote conditions conducive to vegetative growth (slopes of 3:1 [H:V] or flatter). Borrow areas could also be graded in a manner consistent with the continuation of past land uses (e.g., agriculture), or consistent with permitted future land uses based on the property owners' preferences. The borrow areas could be revegetated to conform to the surrounding landscape, or in a manner consistent with past or permitted future land uses, again based on the landowners' preferences. Requirements related to environmental resource surveys, resource avoidance, and mitigation would be the same as described above for the Applicant Preferred Alternative.

## **Relocation of Utilities and Removal of Structures**

Other than the pump station relocation discussed above, it is not anticipated that existing utilities would need to be permanently relocated under the Levee Strengthening Alternative. PG&E power lines may need to be deenergized or temporarily relocated for clearance during excavation operations for the slurry cutoff wall. Other than Pump Station No. 3, there are no other levee penetrations (i.e., pipelines, conduits, or similar structures) passing through the levee.

## **Staging Areas**

It is anticipated that several staging areas would be developed along the existing Feather River levee alignment to allow for efficient use and distribution of materials and equipment. Staging areas would be located along the landside toe of the levee. Final selection of staging areas would be based on contractor preference and environmental and land use constraints. Requirements related to environmental resource surveys and resource avoidance would be the same as described above for the Applicant Preferred Alternative – ASB Setback Levee Alternative.

## **Disposal of Excess Materials**

Because of the nature of the work under the Levee Strengthening Alternative, it is expected that only a limited amount of excess materials (e.g., soil, cleared vegetation) would be generated. Excess excavated materials (organic soils, excess material excavated from the slurry cutoff wall trench, and excess slurry) would be placed in a local disposal area on-site, or hauled off-site and placed in a suitable disposal area. Debris from structure demolition (e.g., the existing Pump Station No. 3), piping, and other materials requiring disposal would be hauled off-site to a suitable landfill.

## **Construction Equipment**

Contractor plant equipment would include construction office and equipment trailers; slurry batch plants, including bentonite storage facilities, mixing tanks, pumps, and piping; warehousing and equipment maintenance facilities; and fuel pumps and fuel storage tanks.

Mobile equipment for the levee repair, berm construction, and Pump Station No. 3 construction may include the following typical equipment:

- ▶ two hydraulic excavators,
- ▶ six scrapers,
- ▶ three bulldozers,
- ▶ three graders,

- ▶ three self-propelled sheepsfoot or tamping-foot rollers,
- ▶ two water wagons,
- ▶ 20 highway dump trucks,
- ▶ a lubricating truck,
- ▶ a front-end loader,
- ▶ a truck-mounted crane, and
- ▶ numerous pickup trucks.

Mobile equipment specifically for slurry cutoff wall construction for three simultaneous headings may include the following:

- ▶ three long-stick hydraulic excavators,
- ▶ three low-ground-pressure bulldozers,
- ▶ three utility excavators, and
- ▶ three integrated tool carriers.

Additional equipment would include utility equipment to install power lines, an air compressor, welding equipment, pumps and piping, communications and safety equipment, erosion control materials, miscellaneous equipment customary to the mechanical and electrical crafts, and vehicles used to deliver equipment and materials.

### **Construction-Related Traffic**

Personnel, equipment, and imported materials would reach the site via SR 70 and Feather River Boulevard, which are paved, all-weather roads, and suitable for the anticipated loads. The construction labor force is estimated to average about 50–60 persons over the construction period of approximately 8 months. Peak staffing could be close to 100 depending on the contractor's schedule.

It is expected that about 40 trailer ("low-boy") truck round trips would be required to transport the contractor's plant and equipment listed above to the site. A similar number of round trips would be needed to remove the equipment from the site as the work is completed.

The sources and modes of transport for construction materials would be the same as described for the Applicant Preferred Alternative – ASB Setback Levee Alternative. About 3,000 highway truck trips would be needed to bring the aggregate base and rock revetment material to the site from the quarry of origin. About 200 truckloads would be needed to bring dry bentonite to the site. About 200 truckloads would be needed to bring cement to the site. Another 20–25 trailer truckloads would be required to bring other permanent materials to the site, such as geotextile fabric, erosion control materials, structural steel, piping, well casings, and ancillary equipment. About 75 concrete loads, transported by transit mixer truck, are also likely. In addition, about 75 highway truckloads may be needed to carry demolition debris, construction debris, and waste dump materials to a suitable landfill.

At the project site, the primary construction corridor would include the crests of the existing Feather River levee, landside toe of the existing levees, and roads used for access to the work area, including Feather River Boulevard. Access roads would consist mainly of the existing east-west lateral roads between SR 70, Feather River Boulevard, and the existing levee.

Within the construction area, the main sources of construction traffic would be the installation of the slurry cutoff wall, required transport of material for the slurry cutoff wall (including borrow from borrow sites), and required transport of borrow material for berm construction and restoration of levee heights (e.g., where the tops of levees were cut down to provide a work surface for installation of the slurry cutoff wall). Transport of an estimated 1.4 million cu. yd. of borrow material would require approximately 70,000 haul trips if a load of 20 cu. yd. per trip is assumed. Larger haul unit sizes would reduce the number of trips and impacts on air quality. Dust control measures would be applied to roads and work areas on a systematic basis.

## Construction Scheduling

A construction period of about 8 months, beginning in the first spring after detailed designs are completed and all agency authorizations are received, is assumed for levee repair and strengthening in project Segment 2 if this alternative is selected. Schedule highlights are as follows:

- ▶ Mobilization: Mobilization would include setting up construction offices and the slurry batch plant and transporting heavy earthmoving equipment to the site. These activities may take about 1 month.
- ▶ Installation of the slurry cutoff wall: This activity would begin soon after mobilization with construction of the work pad. Assuming two headings, construction would take approximately 6 months.
- ▶ Construction of seepage/stability berms: Seepage/stability berms would be constructed concurrently with installation of the slurry cutoff wall.
- ▶ Correction of erosion problem areas: Correction of existing erosion problem areas would occur after construction of the slurry cutoff wall. This activity would take approximately 1 month.
- ▶ Utilities: Any required utility relocation would be conducted concurrent with construction of the slurry cutoff wall.
- ▶ Pump Station No. 3: Construction of the new Pump Station No. 3 would occur concurrently with installation of the slurry cutoff wall. Demolition of the existing Pump Station No. 3 would occur immediately after the new pump station is operational.

## Hydrology and Flood Control Benefits

The Levee Strengthening Alternative would not alter the location or configuration of the existing levees and therefore would not provide any increased flood storage or conveyance capacity. Because this alternative would not alter the hydraulic conditions in the Feather River, the hydrology during both normal flows and flood flow conditions would not be changed. However, the repairs and strengthening of the existing levee that would occur under the Levee Strengthening Alternative would provide flood control benefits. The project levee segment would be more resistant to underseepage, through-seepage, and erosion, and less susceptible to catastrophic breaches. All portions of the levee would meet current engineering and design standards of the CVFPB and the Corps, as well as FEMA geotechnical requirements for through-seepage and underseepage at the water surface elevation of the 100-year flood event.

## Operation and Maintenance

Because the existing levee would remain in place under the Levee Strengthening Alternative, with only minor exterior differences (e.g., presence of stability berms, correction of erosion problem areas), operation and maintenance activities would not be appreciably different from existing conditions. As is the current practice, landowners would be assessed fees for levee operation and maintenance, which would be performed by RD 784 under the supervision of DWR.

## 2.3 COMPARISON OF THE EFFECTS OF THE ALTERNATIVES

The direct environmental effects of the Applicant Preferred Alternative – ASB Setback Levee Alternative and other alternatives are described in Chapter 3, “Affected Environment and Environmental Effects.” (See Sections 3.1 through 3.16 for detailed descriptions of the analysis of effects.) The indirect environmental effects of the Applicant Preferred Alternative and other alternatives are described in Chapter 4, “Cumulative and Growth-Inducing Effects.” The analysis below provides a brief descriptive overview of how the effects of the alternatives compare to one another. Table ES-2 in the Executive Summary chapter of this report provides a summary of the

key impacts of each alternative and various characteristics of each alternative for purposes of comparison. Table ES-3 provides additional characterization of the environmental affects associated with each alternative.

As described in Section 2.2.1, “No-Action Alternative,” no further action would be taken to improve the State/Federal levee system protecting the RD 784 area beyond what might be allowed without triggering NEPA or Section 408 (e.g., minor improvements authorized under NWP #3). Limited or no construction would occur, therefore no significant direct construction-related effects would occur. However, in the absence of sufficient levee improvements, a substantial risk of levee failure and flooding of the portion of the RD 784 area protected by the Segment 2 levee would remain. Available geotechnical information and other data indicate that a future flood event with a 5% or greater probability of occurring (1-in-20 probability) could cause a major levee failure in the Segment 2 area (TRLIA 2006c). A levee failure would result in multiple significant adverse effects to environmental resources (refer to Table ES-2). Although there are only relatively minor direct financial costs associated with the No-Action Alternative, such as the continuation of existing inspection and maintenance activities and potential minor improvements, there would also be little to no financial benefit. Approximately 13,400 acres of combined agricultural land and development currently protected by the Segment 2 levee (including over 3,200 homes in the Plumas Lakes area and hundreds of additional homes scattered through other locations) would remain without 100-year flood protection and would remain exposed to a substantial risk of flooding and associated potential for loss of life and property. Given the high probability of a levee failure occurring in the Segment 2 area and the adverse economic, human, and environmental effects associated with a levee breach, the No-Action Alternative is not selected as the proposed action.

The action alternatives have been developed, as much as possible, to avoid or substantially lessen significant adverse environmental effects. However, as would be expected, the Levee Strengthening Alternative typically would result in fewer direct adverse environmental effects than the two setback levee alternatives because construction activities would be focused on the existing levee alignment (refer to Table ES-2). This alternative, however, also would not result in many of the beneficial effects associated with a setback levee, such as increasing the extent of riparian and floodplain habitat and thus increasing the availability and quality of habitat for terrestrial and aquatic special-status species. In particular, the Levee Strengthening Alternative would not provide regional flood control benefits (i.e., decreases in upstream flood stage elevations, including through the urbanized areas of Marysville and Yuba City) associated with creation of a setback levee. As past levee repair efforts indicate, based on the condition of soils in levee foundations and embankments, the success of repairs to the existing levee could not be assured. Additional repairs or other remedial actions could be required in the future. These conditions would be less likely to occur where a new setback levee was constructed on stable foundation soils away from areas that are underlain by less consolidated alluvial soils, which are more porous and susceptible to underseepage than the older soil formations in upland areas. The Levee Strengthening Alternative also would expose a larger area to potential growth inducing impacts. Under the setback levee alternatives, roughly 1,100 to 1,300 acres of agricultural land would be placed in the expanded floodway. Because this land would be in the floodway, it would not be susceptible to development pressure. Under the Levee Strengthening Alternative, the entire roughly 13,400 acre area protected by the existing Segment 2 levee would be provided 200-year flood protection and flood protection would therefore be removed as an obstacle to growth for the entire area. Given these conditions, the Levee Strengthening Alternative was not selected as the proposed action.

The environmental effects of the Applicant Preferred Alternative – ASB Setback Levee Alternative and the ISL Alternative are the same or very similar for several resources (see Table ES-2). For example, both alternatives would result in the direct removal of 10.9 acres of wetlands/waters of the U.S. associated with construction activities, with 4.2 acres of this habitat ultimately converted to another form of wetlands/waters of the U.S. (e.g., portions of riparian waters of the U.S. in the floodplain drainage swale area converted to open water habitat).

Each of the alternatives involving a setback levee would incorporate over 1,000 acres of existing agricultural lands into the Feather River floodplain. The Applicant Preferred Alternative would result in the irretrievable conversion of approximately 290 acres of Important Farmland, mostly from the levee footprint and parallel

easements. The ISL Alternative would permanently convert approximately 270 acres of Important Farmland for the same uses. The Applicant Preferred Alternative would result in the removal of five residences from the setback area compared to four residences for the ISL Alternative. Neither of these alternatives would be expected to cause significant effects to special-status species after mitigation. Effects related to cultural resources, air quality, noise, and traffic would be generally the same for these two alternatives.

The ISL Alternative would provide approximately 1,100 acres of additional floodway as opposed to 1,300 acres under the Applicant Preferred Alternative. As described in Section 3.3, “Surface and Groundwater Hydrology and Geomorphology,” the additional floodway acreage provided by the Applicant Preferred Alternative allows for increased upstream/regional flood protection benefits relative to the ISL Alternative. During a 100-year flood event, the ISL Alternative would reduce the flood stage elevation at the confluence of the Yuba and Feather Rivers by approximately 1.0 feet, as opposed to an approximately 1.3 foot reduction under the Applicant Preferred Alternative. During a 200-year flood event, the ISL Alternative would reduce the flood stage elevation at the confluence of the Yuba and Feather Rivers by approximately 1.2 feet, as opposed to an approximately 1.6 foot reduction under the Applicant Preferred Alternative. Therefore, although both alternatives would provide 200-year flood protection to the area protected by the current Segment 2 levee (other than the new acreage placed in the floodway), the Applicant Preferred Alternative would provide greater flood protection benefit to areas upstream, including the city of Marysville and Yuba City. Neither alternative would result in significant adverse effects to downstream flood stage elevations.

A substantial portion of the ISL Alternative alignment would be located within the same geologic formation (i.e., soil types) as the existing levee. As discussed previously, the existing Feather River Segment 2 levee is located on soils that are pervious to water and provide passages for underseepage. The existing levee experiences underseepage and through-seepage problems despite numerous engineering repairs to the levee. Because several segments of the ISL Alternative alignment would be located on the same geologic formation as the existing levee, there is a greater probability than under the Applicant Preferred Alternative that over the long-term, a constructed levee along the ISL Alternative alignment could experience persistent underseepage and/or through-seepage problems requiring additional corrective actions. In contrast, most of the setback levee under the Applicant Preferred Alternative would be located on the older, more consolidated soils of the Modesto formation. These soils are expected to have lower water permeability and would provide a better and more reliable levee foundation. Additionally, construction of the setback levee on the Modesto Formation would require smaller cutoff walls and less levee overbuilding to compensate for foundation settlement. Because of the possibility that the ISL Alternative, over the long term, could experience underseepage and through-seepage problems similar to those of the existing levee, the ISL Alternative is considered to be a less reliable flood protection alternative than the Applicant Preferred Alternative.

Given the relative similarity in environmental effects between the Applicant Preferred Alternative and the ISL Alternative, given the greater certainty that the Applicant Preferred Alternative will meet flood protection objectives over the long-term without additional levee work or other intervention, and given the increased regional flood protection benefits provided by the Applicant Preferred Alternative, the Applicant Preferred Alternative is identified as the proposed action in this EIS.

## **3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL EFFECTS**

### **3.0.1 INTRODUCTION**

This chapter describes the existing environmental resources in the project area and the potential direct effects to these resources from implementation of the Applicant Preferred Alternative – Above Star Bend (ASB) Setback Levee Alternative (also referred to as the “Applicant Preferred Alternative”) and the other alternatives. Indirect effects resulting from the Applicant Preferred Alternative and other alternatives, such as the provision of flood protection removing an obstacle to implementing planned development in portions of the Reclamation District (RD) 784 area, are addressed in Chapter 4.0, “Cumulative and Growth Inducing Effects.” The project area for Segment 2 of the Feather River Levee Repair Project (FRLRP) is shown in Figure 2-1 in Chapter 2.0, “Alternatives.”

Section 3.0.2 discusses resources that were eliminated from detailed analysis. Sections 3.1 through 3.16 provide a detailed analysis of direct effects for each of the resources of concern, which were identified based on the potential for the Applicant Preferred Alternative – ASB Setback Levee Alternative and other alternatives to have a substantial adverse direct effect on these resources.

The sections addressing resources of concern are organized as follows:

- 3.1 Land Use and Agriculture
- 3.2 Geology and Soils
- 3.3 Surface and Groundwater Hydrology and Geomorphology
- 3.4 Water Quality
- 3.5 Hazardous Materials
- 3.6 Waters of the United States and Wetlands
- 3.7 Terrestrial Biological Resources
- 3.8 Fisheries
- 3.9 Special-Status Biological Resources
- 3.10 Cultural Resources
- 3.11 Air Quality
- 3.12 Noise and Vibration
- 3.13 Transportation and Circulation
- 3.14 Public Services, Utilities, and Service Systems
- 3.15 Paleontological Resources
- 3.16 Socioeconomics and Environmental Justice

### **3.0.2 ENVIRONMENTAL RESOURCES ELIMINATED FROM DETAILED ANALYSIS**

Direct effects on several environmental resources were examined and found to be minor. Below is a discussion of these resources and the reasons they were eliminated from detailed discussion. For each resource area, although they may be eliminated from detailed discussion regarding direct project effects, they are still considered in the context of growth-inducing and cumulative effects (i.e., indirect effects) in Chapter 4.0, “Cumulative and Growth-Inducing Effects.”

### 3.0.2.1 POPULATION AND HOUSING

Improvements to Segment 2 of the FRLRP would not involve the construction of new housing or require the addition of housing to accommodate workers. The Applicant Preferred Alternative – ASB Setback Levee Alternative and other alternatives would not directly alter local population, housing, or employment conditions, other than adding temporary construction jobs while flood control improvements were implemented. The provision of increased flood protection associated with the Applicant Preferred Alternative and other alternatives would indirectly influence future development in the Reclamation District (RD) 784 area. This indirect effect is addressed in Chapter 4.0, “Cumulative and Growth-Inducing Effects.”

### 3.0.2.2 AESTHETIC RESOURCES

The project area extends from Star Bend upstream to west of the Yuba County Airport (Figures 1-1 and 2-1). Views towards the existing levee from Feather River Boulevard and lands west of this roadway are neither striking nor distinctive, consisting primarily of orchards and other agricultural lands. Drainage canals and ponds are located in the southern half of Segment 2. The existing levee blocks views of the Feather River from the east. The tops of trees in the riparian area west of the levee are visible from some areas east of the levee. Parts of the existing levee are visible in long-distance views across open agricultural land from certain areas east of Feather River Boulevard, including parts of State Route (SR) 70, the Yuba County Airport west of Olivehurst, rural roadways, and scattered residences.

The major components of the Applicant Preferred Alternative – ASB Setback Levee Alternative, as well as the Intermediate Setback Levee Alternative, are preparing the setback levee foundation; constructing the setback levee; excavating borrow areas; transporting material from borrow areas to the setback levee alignment; relocating Pump Station No. 3; removing the existing levee; restoring borrow areas to original grade using soil from the degraded levee; and removing, relocating, and reinforcing utility infrastructure in the setback area. Most changes to utility infrastructure would involve underground facilities (wells, irrigation pipes) or relatively small above ground facilities (power poles, well pumps) and would not alter the visual character of the area or result in an adverse effect to the visual environment. Replacement of the Bogue Loop electrical transmission towers by Pacific Gas & Electric Company would include the construction of towers that would be from 17 to 25.5 feet taller than the existing towers, which are 94 feet tall. The one four-legged tower immediately east of the existing levee would be replaced with a tower that is approximately 15 feet taller than the other replacement towers. The replacement towers would be installed along the same alignment as the existing towers. The replacement towers in the new levee setback area would be stronger than existing towers in order to withstand regular inundation in the floodway. Due to this increased strength, the space between towers can be larger, resulting in one less tower between the setback levee and the existing levee (three towers rather than four) relative to existing conditions. The existing towers are currently a prominent visual feature in the area, and replacing these towers with new towers would not affect a scenic vista, alter the visual character of the area, or have an adverse effect on the character or quality of views in the area.

Alterations to the visual character of the project site during construction (i.e., presence of construction equipment and staging areas) would be isolated and temporary, and would be observed by a relatively small number of viewers due to the agricultural and rural nature of the project site. Views from the western end of the Feather River floodway would be screened or partially screened by riparian vegetation, and many views from the land side of the construction corridor would be largely screened by orchard trees. The construction of a setback levee would somewhat alter the long-term appearance of the Segment 2 area by taking an existing feature, a levee, and moving it farther to the east. However, because of the flat terrain and screening by orchards, the setback levee would not be visible from most vantage points. In general, construction of a setback levee would not adversely affect a scenic vista and would not have a substantial adverse effect on the character or quality of views of the area.



Under the Levee Strengthening Alternative the existing levee in Segment 2 would be repaired and strengthened, with little change to the appearance of the levee and little to no modification of utilities and other features. Implementation of this alternative would not directly adversely affect a scenic vista and would not have an adverse effect on the character or quality of views of the area.

### **3.0.2.3 RECREATION**

The Applicant Preferred Alternative – ASB Setback Levee Alternative and other alternatives would not involve the construction of new housing or other facilities that would increase demand for recreational facilities, and would not permanently add, remove, or alter designated recreational facilities. The provision of increased flood protection associated with the Applicant Preferred Alternative and other alternatives would indirectly influence future development in the Reclamation District (RD) 784 area, and hence demand for recreational facilities. This indirect effect is addressed in Chapter 4.0, “Cumulative and Growth-Inducing Effects.” Access to the existing levee is limited; vehicles are prohibited from driving on the levee, and parking is limited to an area at the Star Bend Boat Ramp access. Recreational activities such as walking, jogging, and cycling take place informally on the existing levee. It is assumed that these same activities could take place on the new setback levee to the extent that these opportunities are available on the existing levee. Levee repairs under the Levee Strengthening Alternative would temporarily disrupt the informal use of the levee crown as a pedestrian and bike path. Access to the Star Bend Boat Ramp would be restricted for approximately 30 days during construction in the vicinity of this recreational area. However, limitations on the use of recreation facilities would only occur during project construction and would be short term and temporary. A substantial change or reduction in the availability of recreational opportunities would not occur as a result of the Applicant Preferred Alternative or other alternatives.

## **3.1 LAND USE AND AGRICULTURE**

The following analysis addresses direct effects of the Applicant Preferred Alternative – Above Star Bend (ASB) Setback Levee Alternative (also referred to as the “Applicant Preferred Alternative”) and other alternatives. Indirect effects of the Applicant Preferred Alternative and other alternatives are addressed in Chapter 4.0, “Cumulative and Growth-Inducing Effects.” For example, for an evaluation of Important Farmland conversions resulting from development potentially facilitated by the Applicant Preferred Alternative and other action alternatives, see Section 4.1.2.2, “Land Use and Agriculture.” For an evaluation of Important Farmland conversions relative to past and future conversion trends in Yuba County, see Section 4.2.4.1, “Land Use and Agriculture.”

### **3.1.1 EXISTING CONDITIONS**

#### **3.1.1.1 REGIONAL CONTEXT**

Land uses in western Yuba County consist mainly of various agricultural uses, mineral extraction, open space/ grazing lands, urban uses, and military operations at Beale Air Force Base. Agriculture is the predominant land use in the county and the most important contributor to the local economy (Yuba County 1994). The major agricultural crops produced in the county are rice, plums, peaches, walnuts, kiwifruit, field crops, and almonds. Pastureland for grazing of beef and dairy cattle is also a major agricultural land use.

Yuba County’s urban centers are in the western portion of the county. The urbanized areas are the incorporated cities of Marysville and Wheatland and the unincorporated communities of Linda and Olivehurst. Substantial development is also ongoing in the Plumas Lake Specific Plan area, which occupies approximately 5,300 acres west of SR 70 between Olivehurst and the Bear River. The specific plan allows for 12,000 dwelling units and approximately 600 acres of commercial and industrial uses. Residential development was approved and construction was initiated several years ago in the specific plan area, with approximately 3,200 homes currently completed and occupied.

#### **3.1.1.2 PROJECT AREA**

##### **Land Ownership and Jurisdiction**

The existing Feather River levee in Feather River Levee Repair Project (FRLRP) Segment 2 is part of the federal-state Sacramento River Flood Control Project (SRFCP) within an easement obtained by the State of California through the Sacramento–San Joaquin Drainage District. The levee was constructed by the U.S. Army Corps of Engineers (Corps) and is maintained by RD 784 under the supervision of the Central Valley Flood Protection Board (CVFPB).

All lands in the project area are in unincorporated Yuba County. The County has land use planning jurisdiction over privately owned land in this area.

In addition to the County, several entities have authority over land uses in the project vicinity. The 698-acre Lake of the Woods Unit of the Feather River State Wildlife Area, owned by the State of California and managed by the California Department of Fish and Game (DFG), is located along the existing left bank levee of the Feather River just south of Segment 2. The Star Bend Boat Launch and Fishing Access owned by DFG and maintained by the County Public Works Department is located north of the Lake of the Woods Unit at Star Bend at the southern terminus of Segment 2. The 76-acre Marysville-Yuba City Mitigation Area is located along the west side of the existing left bank levee of the Feather River in Segment 2, approximately 1½ miles north of Star Bend. The CVFPB owns the property. Elderberry shrubs were planted on the site to provide habitat for valley elderberry longhorn beetle to mitigate potential impacts on this species caused by past regional levee improvement projects.

Established seasonal wetlands and riparian vegetation in the mitigation area provide wildlife habitat for various species. (Whitmore, pers. comm., 2007).

## Local Land Uses

Lands in the project area are particularly suited for agriculture, although parts of the area have suffered flood events that have resulted in crop damages. The most recent major floods occurred in 1950, 1955, 1964, 1986, and 1997. See Section 1.6, “Need for Improved Flood Protection,” for more information on the flood history in the RD 784 area. During the 1997 flood, resulting from a levee breach in the Segment 2 area of the Feather River left bank levee, more than 11,000 acres of agricultural land was inundated. As of 2006, there were approximately 228,113 acres of agricultural land in Yuba County, classified by the California Department of Conservation as 41,993 acres of Prime Farmland, 11,019 acres of Farmland of Statewide Importance, 32,372 acres of Unique Farmland, and 142,729 acres of Grazing Land (California Department of Conservation 2007). The total area of Important Farmland in the County (Prime Farmland, Farmland of Statewide Importance, and Unique Farmland) is 85,384 acres. The project area includes Important Farmland as well as Grazing Land and Other Land as classified by the California Department of Conservation. The *Soil Survey of Yuba County, California* identifies Class I and II soils in the project area (Natural Resources Conservation Service 1998). The proposed levee setback area (excluding the setback levee footprint) encompasses approximately 1,300 acres, of which approximately 1,025 acres are considered Prime Farmland, 10 acres are considered Farmland of Statewide Importance, and 10 acres are considered Unique Farmland.

Most of the land in the project vicinity is currently under cultivation, with the majority of the acreage planted in orchards. Some row crops are also planted. Crops grown in orchards in the project vicinity consist of walnuts, peaches, prunes, apples, persimmons, and pears, with prunes and walnuts making up the greatest percentage. Typical row crops planted in the area include cantaloupe, honeydew melon, and wheat. Several industrial facilities supporting agricultural operations are also located in the project vicinity, such as produce packing plants.

Facility surveys have identified approximately 20 structures located along Segment 2 between the proposed setback levee alignment and the existing levee. Five of these structures are occupied residences, including one mobile home. Between the Intermediate Setback Levee Alignment and the existing levee there are approximately 15 structures, with three being residences, including one mobile home. The density of residences in the project vicinity increases as one moves north along the project alignment. Within the proposed levee setback area, land uses are primarily agriculture (1,195 acres) and some residential and rural residential uses (6 acres), as shown in Table 3.3-1.

## Land Use Designations and Zoning

The general plan land use designation for the project area and adjacent lands east of the Feather River is Valley Agriculture. The Valley Agriculture designation is used to identify areas on the valley floor outside of community boundaries that are suitable for commercial agriculture and where it is desirable to retain agriculture as the primary land use; to protect the agricultural community from encroachment of unrelated uses that would injure the physical and economic well-being of the agricultural community; and to encourage the preservation of productive and potentially productive agricultural land, which is identified as state-designated Important Farmlands and/or lands having NRCS-classified Class I and II soils.

The lands between the proposed setback levee alignment and the existing levee are zoned Exclusive Agricultural (Yuba County 2005). The purpose of the Exclusive Agricultural zone is to eliminate the encroachment of land uses that are incompatible with the agricultural uses of the land and to prevent the unnecessary conversion of agricultural land to urban uses. In addition to agricultural uses such as crop cultivation and livestock raising, this zoning designation allows for low-density residential use, accessory buildings for residences, game preserves, family day-care homes, kennels, and farm produce stands, among other uses. Numerous other uses may be allowed with a Conditional Use permit.

Existing and planned future land uses within the proposed levee setback area, under the existing Yuba County General Plan, are shown in Table 3.1-1 below.

| <b>Table 3.1-1<br/>Yuba County General Plan: Existing and Planned Land Uses<br/>Within the Proposed Levee Setback Area</b> |       |                                             |       |
|----------------------------------------------------------------------------------------------------------------------------|-------|---------------------------------------------|-------|
| Existing Land Uses                                                                                                         |       | Future Land Uses, Build Out of General Plan |       |
| Land Use                                                                                                                   | Acres | Land Use                                    | Acres |
| Agriculture                                                                                                                | 1,195 | Public Lands                                | 130   |
| Infrastructure                                                                                                             | 3     | Valley Agriculture                          | 1,170 |
| Miscellaneous                                                                                                              | 81    | TOTAL                                       | 1,300 |
| Natural Resources                                                                                                          | 10    |                                             |       |
| Public Lands                                                                                                               | 5     |                                             |       |
| Rural Residential                                                                                                          | 4     |                                             |       |
| Single-family Residential                                                                                                  | 2     |                                             |       |
| TOTAL                                                                                                                      | 1,300 |                                             |       |

### 3.1.2 ENVIRONMENTAL CONSEQUENCES

Note that the following analysis addresses direct effects of the Applicant Preferred Alternative – ASB Setback Levee Alternative and other alternatives. Indirect effects of the Applicant Preferred Alternative and other alternatives are addressed in Chapter 4.0, “Cumulative and Growth-Inducing Effects.” For an evaluation of Important Farmland conversions resulting from development potentially facilitated by the Applicant Preferred Alternative and other action alternatives, see Section 4.1.2.2, “Land Use and Agriculture,” in the analysis of growth-inducing effects. For an evaluation of Important Farmland conversions relative to past and future conversion trends in Yuba County, see Section 4.2.4.1, “Land Use and Agriculture,” of the cumulative impact analysis.

#### 3.1.2.1 SIGNIFICANCE CRITERIA

An alternative would have a significant impact on land use (including displacement of housing) if it would:

- ▶ physically divide an established community;
- ▶ conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project adopted for the purpose of avoiding or mitigating an environmental effect;
- ▶ conflict with any applicable habitat conservation plan or natural community conservation plan;
- ▶ conflict with existing zoning for agricultural use or a Williamson Act contract; or
- ▶ displace substantial numbers of existing persons or housing, necessitating the construction of replacement housing elsewhere.

An alternative would be considered to have a significant effect on Important Farmland (i.e., Prime Farmland, Unique Farmland, Farmland of Statewide Importance) if it would result in an irretrievable conversion of a

substantial acreage of such land. An irretrievable conversion is considered to be one that involves the conversion to land uses that would cause serious degradation of the quality of soils and/or result in expenditures of substantial development costs that would likely preclude the practicality of future conversion back to agriculture.

No habitat conservation or natural community conservation plans are in effect that would apply to the project area. In addition, Yuba County does not participate in the Williamson Act, so no lands are under Williamson Act contract in the project area. The project site is dominated by agricultural lands and residences are not clustered or located within an identified community. Five residences would be removed from the setback area during implementation of the Applicant Preferred Alternative – ASB Setback Levee Alternative. The existing housing stock in the in the project vicinity (Marysville, Yuba City, Olivehurst, Linda, Plumas Lake, etc.) has sufficient available housing for rent and purchase to accommodate displaced residents from these five homes. The Applicant Preferred Alternative would not result in the displacement of a substantial numbers of existing persons or housing, necessitating the construction of replacement housing elsewhere. Therefore, the first, third, fourth and fifth significance criteria do not apply to the Applicant Preferred Alternative and other alternatives and are not considered further.

### **3.1.2.2 APPLICANT PREFERRED ALTERNATIVE – ASB SETBACK LEVEE ALTERNATIVE**

#### **AP Impact 3.1-a: Convert Important Farmland to Nonagricultural Uses**

The setback levee footprint and levee easements under the Applicant Preferred Alternative – ASB Setback Levee Alternative would permanently convert a total of approximately 210 acres of Prime Farmland, 35 acres of Farmland of Statewide Importance, and 2 acres of Unique Farmland to nonagricultural uses. The Applicant Preferred Alternative would also include the new construction and removal of Pump Station No. 3, which would convert up to 1 acre of Prime Farmland to nonagricultural use.

Development of borrow areas outside the setback area would temporarily remove agricultural land from production until levee degradation takes place and the borrow areas are returned to original grade. Topsoil would be removed and stockpiled from borrow sites and replaced after regrading to ensure the continued productivity of agricultural lands in the borrow areas. For the large borrow area in the levee setback area, topsoil may be stockpiled for use in borrow area reclamation. An exception would be the potential soil borrow site east of Feather River Boulevard and just north of Ella Road (Figure 2-1). This site, identified as the Ella Road Borrow Site, is adjacent to an existing stormwater detention basin. Once use of the borrow site is complete, it would not be refilled, but would be connected to the existing detention basin to expand the capacity of the basin. It is unclear what farmland classification might be applied to the site (e.g., Prime Farmland, Grazing Land, Other Land) since the site is highly disturbed and excess soil from construction of the adjacent detention basin has been spread over the site. For the purposes of this analysis, use of the Ella Road borrow site is considered to result in the permanent conversion of 18 acres of agricultural land to another use (i.e., stormwater detention basin).

It is anticipated that several staging areas and temporary-access haul roads would be developed on agricultural lands in the project area during project construction. Land at construction staging areas and haul roads classified as Important Farmland could be temporarily taken out of production for the duration of the construction period to accommodate preconstruction and construction activities. These areas would be returned to preproject conditions and agricultural uses could resume once construction is completed. Therefore, there would be no direct conversion of Important Farmland to nonagricultural uses in construction staging areas.

Placement of a setback levee would indirectly result in removal of more land from agricultural production because some properties would be divided by the setback levee, which could make continued farming of some crops, or any farming on some parcels, impractical. However, this would not necessarily result in an irretrievable conversion of agricultural land. Much of this land could continue to be cultivated if appropriate crops and agricultural practices for relatively small acreages were used.

It is likely that some land in the setback area will be converted to habitat as mitigation for project impacts; however, the TRLIA board has adopted a policy to maintain as much of the setback area in agricultural use as is economically feasible and subject to ensuring public safety (see Appendix C). It is reasonable to assume that one-half or more of the roughly 1,045 acres of Important Farmland in the setback area would be retained in agricultural operations. Under these circumstances, up to approximately 525 acres of Important Farmland in the setback area would be taken out of agricultural production and converted to habitat. Of the 525 acres, approximately 40 acres would be held under a permanent conservation easement for planting of elderberry shrubs (both relocated shrubs and seedlings) and associated riparian species to compensate for elderberry shrubs that would be moved out of the project construction area, in accordance with U.S. Fish and Wildlife Service (USFWS) requirements (see Section 3.7, “Terrestrial Biological Resources,” for further information on elderberry shrub impacts and mitigation). Because these approximately 40 acres would be placed under a habitat conservation easement, they would not be available for potential future conversion to agricultural land, and are considered a permanent conversion of agricultural land to another use. However, the roughly 485 remaining acres of conversion of farmland to native habitat would not result in an irretrievable loss of previously farmed lands. The soil would retain the characteristics that make it suitable for agriculture and lands not subject to the conservation easement could be cultivated again.

Considering all potential mechanisms for removal of agricultural land from production, for the purposes of this analysis, it is assumed that implementation of the Applicant Preferred Alternative – ASB Setback Levee Alternative would result in the irretrievable conversion of approximately 290 acres of Important Farmland and 18 acres of additional unclassified agricultural land at the Ella Road borrow site. In addition to the 525 acres that would be converted to habitat, 35 acres would be temporarily removed from agricultural uses during project construction (e.g., in areas where haul roads or staging areas could affect relatively small areas). Therefore, approximately 560 acres of Important Farmland could be taken out of production, but would not be subject to an irretrievable conversion to another use, except for approximately 40 acres that would be placed under a permanent habitat conservation easement.

Although the Applicant Preferred Alternative – ASB Setback Levee Alternative would result in the removal of several hundred acres of Important Farmland from agricultural production, implementation of the Applicant Preferred Alternative would not conflict with the intent of the *Yuba County General Plan* and Yuba County Zoning Ordinance with regard to preservation of agricultural land. Much of the land in the setback area would be maintained in agricultural use and would be protected in perpetuity from future development pressure by being placed in the Feather River floodplain. Currently farmed land in the setback area that would be converted to habitat would not lose its potential as productive agricultural land. Furthermore, the proposed improvements to the flood control system would benefit thousands of acres of valuable agricultural land in the RD 784 area, including Prime Farmland and other Important Farmland, by providing increased protection from future flood damages. It should also be noted that agricultural operators would receive appropriate compensation for any temporary disturbance or permanent loss of agricultural lands associated with project implementation. In addition, all property acquisitions and relocations conducted as part of the project would be completed following both the Federal Uniform Relocation Act and the California Relocation Assistance Law. Eligible farm operations would receive relocation assistance consistent with these federal and state statutes.

Although the Applicant Preferred Alternative – ASB Setback Levee Alternative would result in the irretrievable conversion of approximately 290 acres of Important Farmland, this is not considered a substantial amount relative to the Important Farmland available in Yuba County. In 2006 (the most recent date when data is available), there were approximately 85,384 acres of Important Farmland in Yuba County. A conversion of 290 acres would account for approximately 0.3% of this total. If all 815 acres of Important Farmland assumed to be taken out of production as a result of the Applicant Preferred Alternative were considered an irretrievable conversion of agricultural land, this would constitute approximately 0.9% of the Important Farmland in the County. Given these conditions, the Applicant Preferred Alternative would not result in a significant impact regarding the conversion of agricultural land.



## **AP Impact 3.1-b: Potential Conflict with Local Land Use Designations**

The Yuba County General Plan land use designation for the land in the setback area is Valley Agriculture. As discussed above, the TRLIA board is committed to maintaining as much of the setback area in agricultural use as is economically feasible, subject to ensuring public safety (Appendix C). It is assumed that up to approximately 525 acres of Important Farmland in the setback area would remain in agricultural production. Although all dwellings and accessory structures that are currently in the setback area would be removed, temporary and readily removable structures accessory to agricultural uses could be erected on some parcels following implementation of the Segment 2 setback levee project. These types of structures would not be allowed to remain in the setback area year-round. Yuba County is undertaking a comprehensive update of its general plan that was last updated in 1996. The current update is expected to be completed in early 2009. TRLIA is continuing to coordinate with the Yuba County Planning Department on planning issues for the RD 784 area, and any necessary amendment to the general plan land map for the project area will be part of the process to update the general plan.

The lands between the proposed setback levee alignment and the existing levee are zoned Exclusive Agricultural. The use of the levee setback area as a floodway would be inconsistent with various uses allowed under the Exclusive Agricultural zoning. For example, residential dwellings and various types of accessory structures are allowed under the Exclusive Agricultural zoning; following construction of the setback levee, however, buildings and various land uses within the levee setback area would be prohibited by regulations of the CVFPB. It is anticipated that certain temporary structures in agricultural use areas would be acceptable. As part of the current general plan update, the Yuba County Planning Department would resolve potential remaining zoning inconsistencies and propose rezoning of parcels as necessary, including land within the Segment 2 setback area. Any necessary amendment of the general plan land use map and related zoning, or placement of restrictions on zoning, would be determined by the Yuba County Planning Department and approved by the County Planning Commission and Board of Supervisors as appropriate. Any inconsistencies that could be created by construction of the Segment 2 setback levee will be resolved before permanent changes in allowable land uses occurred; therefore, the Applicant Preferred Alternative – ASB Setback Levee Alternative would not result in a significant impact relating to an inconsistency with the general plan land use designation or zoning for the area.

### **3.1.2.3 INTERMEDIATE SETBACK LEVEE ALTERNATIVE**

#### **ISL Impact 3.1-a: Convert Important Farmland to Nonagricultural Uses**

The Intermediate Setback Levee footprint and levee easements would permanently convert a total of approximately 210 acres of Prime Farmland, 10 acres of Farmland of Statewide Importance, and 5 acres of Unique Farmland to nonagricultural uses. The Intermediate Setback Levee Alternative would also include the new construction and removal of Pump Station No. 3 which would convert up to 1 acre of Prime Farmland to nonagricultural use. It is assumed that the setback area under this alternative would be managed in a similar manner as described for the Applicant Preferred Alternative – ASB Setback Levee Alternative, with at least half of the setback area retained in agricultural operations and remaining lands converted to habitat. Under these circumstances, up to approximately 360 acres of Important Farmland in the setback area would be taken out of agricultural production and converted to habitat. Of the 360 acres, approximately 40 acres would be placed under a habitat conservation easement as part of mitigation requirements and would therefore be considered a permanent conversion of agricultural land to another use. Therefore, the Intermediate Setback Levee Alternative could result in the permanent conversion of up to approximately 270 acres of Important Farmland to another use. These conversions of Important Farmland are less than those assumed for the Applicant Preferred Alternative. Therefore, like the Applicant Preferred Alternative, and for the reasons described above for the Applicant Preferred Alternative, the Intermediate Setback Levee Alternative would not result in a significant impact regarding the conversion of agricultural land.

### **ISL Impact 3.1-b: Potential Conflict with Local Land Use Designations**

Construction of a setback levee and expansion of the Feather River floodway in project Segment 2 under the Intermediate Setback Levee Alternative would require the Yuba County Planning Department to consider amending the general plan land use map and rezoning of the parcels within the setback area to address the inconsistency with the current Exclusive Agricultural zoning. TRLIA is continuing to coordinate with the Yuba County Planning Department on planning issues for the RD 784 area. Any necessary amendment to the general plan land map or proposed rezone for the project area will be part of the process to update the general plan. Any inconsistencies that could be created by construction of the Intermediate Setback Levee Alternative will be resolved before permanent changes in allowable land uses occurred; therefore, this alternative would not result in a significant impact relating to an inconsistency with the general plan land use designation or zoning for the area.

#### **3.1.2.4 LEVEE STRENGTHENING ALTERNATIVE**

### **LS Impact 3.1-a: Convert Important Farmland to Nonagricultural Uses**

It is expected that levee repairs and strengthening under this alternative would require construction of seepage stability berms on the land side of the existing levee. Current estimates indicate that all berms combined would cover approximately 25 acres of land area. The exact locations of the berms would be confirmed during detailed project design, at which time the extent of impacts to individual categories of Important Farmland (e.g., Prime Farmland, Unique Farmland) could be determined. The removal of Pump Station No. 3 and replacement with a new pump station would convert up to 1 additional acre of agricultural land to a nonagricultural use. A total of 26 acres of agricultural land conversion is substantially less than described above for the Applicant Preferred Alternative – ASB Setback Levee Alternative. Therefore, like the Applicant Preferred Alternative, and for the reasons described above for the Applicant Preferred Alternative, the Levee Strengthening Alternative would not result in a significant impact regarding the conversion of agricultural land.

#### **3.1.2.5 NO-ACTION ALTERNATIVE**

If no permissions were granted to alter the existing levee or discharge dredged or fill material into waters of the United States, no direct changes in land use or conversion of farmland to other uses would occur. Under these conditions, heavy underseepage and loss of foundation soils would be expected to continue and the threat of another levee failure in the Segment 2 project area would remain. Under the No-Action Alternative, it is possible that localized levee repairs (e.g., correction of identified waterside erosion sites) could be authorized under the federal Clean Water Act (CWA) Nationwide Permit (NWP) #3. This work would be unlikely to cause any significant permanent changes to existing land uses.

The vast majority of the land adjacent to the levee in Segment 2 is in agricultural use with some residential uses. If no action was taken to completely repair this deficient levee segment, a levee failure in this area during future high-flow conditions would likely cause the type of severe scouring of farmland that has occurred at the site of past levee breaks, resulting in damage of the soil structure, deposit of large quantities of sandy material, and an associated reduction of agricultural productivity on these adjacent lands. Flood waters are also likely to erode agricultural land beyond the levee break location. Much of the agricultural land in the RD 784 area is planted in orchards, and prolonged exposure to floodwater could temporarily or permanently decrease the productivity of some fruit and nut-bearing trees and increase overall orchard mortality. Flooding of agricultural areas would likely destroy or severely damage agricultural outbuildings and residences and could seriously damage large agricultural processing facilities, leading to serious reduction in agricultural productivity and depression of the agricultural economy. Abandonment of, or failure to maintain cultivation of productive agricultural land after a flood event, as well as damage of residential and commercial properties would likely result in adverse effects on the physical and economic well-being of this mainly agricultural community, which could be difficult to reverse.

### 3.1.3 MITIGATION

No significant land use impacts are identified above and no mitigation measures are required. However, TRLIA has previously committed to several measures through the California Environmental Quality Act (CEQA) review process to further minimize adverse effects on agricultural lands.

#### **Mitigation Measure 3.1-a1: Minimize Disturbance of Important Farmland and Continuing Agricultural Operations**

The following mitigation measure, repeated from the FRLRP Environmental Impact Report (EIR), would be applied to the **Applicant Preferred Alternative – ASB Setback Levee Alternative, Intermediate Setback Levee Alternative, and Levee Strengthening Alternative**.

Minimize the disturbance of Important Farmland and continuing agricultural operations during construction by locating construction laydown and staging areas on sites that are fallow, that are already developed or disturbed, or that are to be discontinued for use as agricultural land, and by using existing roads to access construction areas to the extent possible.

#### **Mitigation Measure 3.1-a2: Ensure Access to Setback Properties, Salvage Topsoil, and Relocate Utilities**

The following mitigation measure, repeated from the FRLRP EIR, would be applied to the **Applicant Preferred Alternative – ASB Setback Levee Alternative and Intermediate Setback Levee Alternative**.

Where lands classified as Important Farmland in the levee setback area are to be retained in agricultural production, TRLIA shall ensure that the following measures are implemented, to the extent feasible and practicable, in the design and implementation of the levee setback:

- a. Where the setback levee would transect agricultural properties and the continuation of agricultural use on the portions within the levee setback area would occur, ensure convenience of access to the levee setback properties sufficient to support ongoing agricultural operations.
- b. Make the most productive salvaged topsoil from the levee footprint available to landowners with less productive agricultural lands in the vicinity of, but outside the levee setback area that could benefit from the introduction of good-quality soil. By agreement between TRLIA or landowners of affected properties and the recipient(s) of the topsoil, the recipient(s) would be required to work the topsoil into the agricultural lands where it is delivered.
- c. Ensure that utilities currently in the levee setback area that are needed for ongoing agricultural uses, including wells, pipelines, and power lines, are appropriately relocated, replaced, or retrofitted to withstand flooding. Ensure that these systems and drainage systems are functioning as necessary after the project is in place so that agricultural uses are not unduly disrupted.

## **3.2 GEOLOGY AND SOILS**

The following analysis addresses direct effects of the Applicant Preferred Alternative – Above Star Bend (ASB) Setback Levee Alternative (also referred to as the “Applicant Preferred Alternative”) and other alternatives. Indirect effects of the Applicant Preferred Alternative and other alternatives are addressed in Chapter 4.0, “Cumulative and Growth-Inducing Effects.” For example, potential impacts related to unstable soils, soil erosion, and seismic activity resulting from development that could be facilitated by the Applicant Preferred Alternative and other action alternatives are discussed under Section 4.1.2.4, “Geology, Soils, and Mineral Resources.” For an evaluation of the combined effects related to geologic conditions, soil erosion, and seismic hazards from implementation of past, present, and future projects in the region, see Section 4.2.4.2, “Geology, Soils and Mineral Resources.”

### **3.2.1 EXISTING CONDITIONS**

#### **3.2.1.1 GEOLOGIC CONDITIONS**

##### **Regional Geology and Soils**

The project area is located within the northern portion of the Sacramento Valley, which, together with the San Joaquin Valley, comprises the Great Valley geomorphic and geotectonic province. The Great Valley is a forearc basin composed of thousands of feet of sedimentary deposits that has undergone periods of subsidence and uplift over millions of years. During the Jurassic and Cretaceous periods of the Mesozoic era, the Great Valley existed in the form of an ancient ocean. By the end of the Mesozoic, the northern portion of the Great Valley began to fill with sediment as tectonic forces caused uplift of the basin. Geologic evidence suggests that the Sacramento Valley and San Joaquin Valley gradually separated into two separate water bodies as uplift and sedimentation continued.

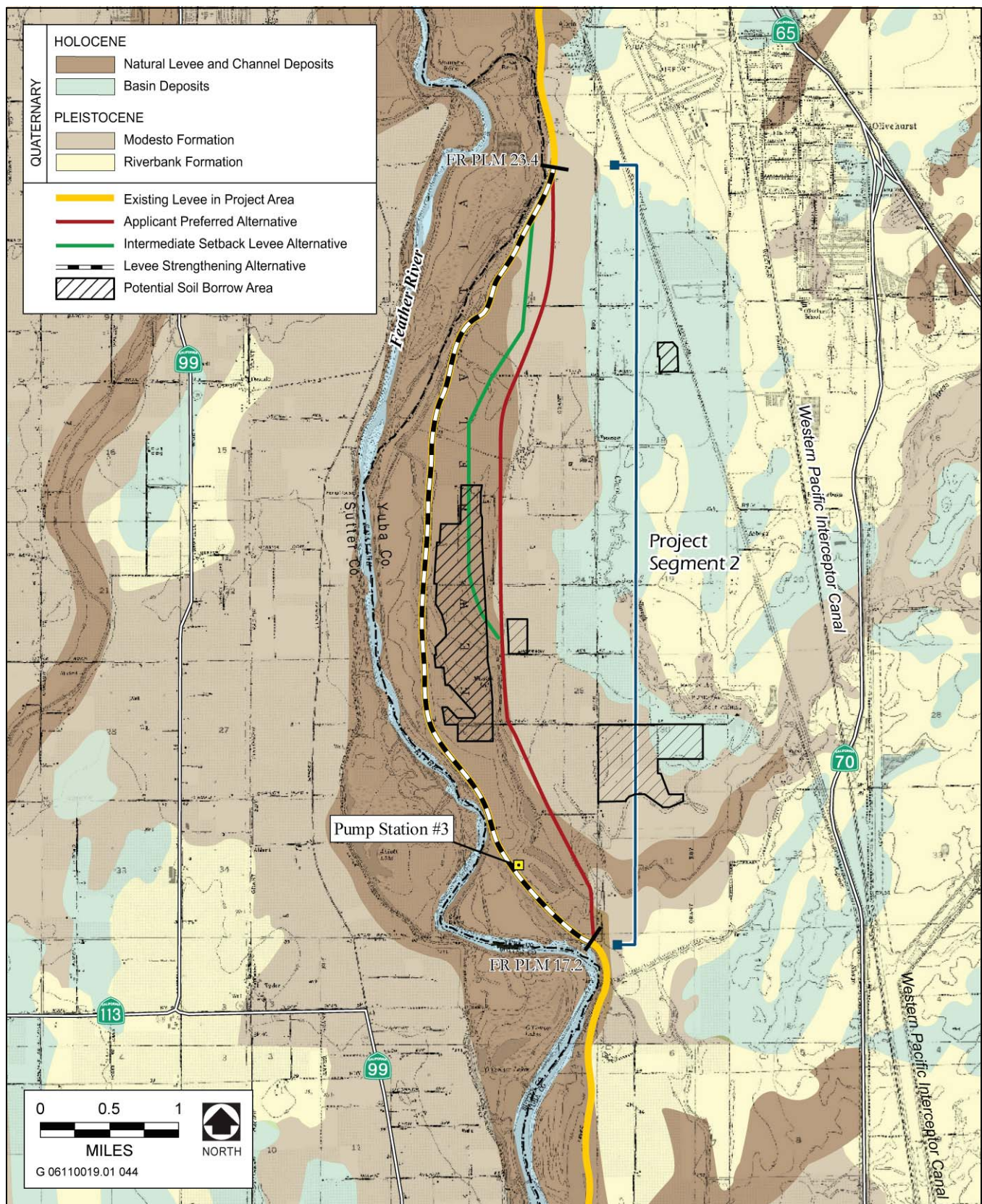
Most of the surface of the Great Valley is covered with Recent (Holocene, i.e., 10,000 years Before Present [BP] to present day) and Pleistocene (i.e., 10,000–1,800,000 years BP) alluvium. This alluvium is composed of sediments from the Sierra Nevada to the east and the Coast Range to the west that were carried by water and deposited on the valley floor. Siltstone, claystone, and sandstone are the primary types of sedimentary deposits.

Most of the soils on the valley floor are shallow to moderately deep, sloping, well-drained soils with very slowly permeable subsoils underlain with hardpan. These soils have good natural drainage, slow subsoil permeability, and slow runoff (Natural Resources Conservation Service 1998). These soils are used primarily for pasture, range, and cultivation of grains and rice.

##### **Project Area Geologic and Soil Conditions**

Geologic formations within the Feather River Levee Repair Project (FRLRP) project area, including Segment 2, the site of the Applicant Preferred Alternative – Above Star Bend (ASB) Setback Levee Alternative (also referred to as the “Applicant Preferred Alternative”) and other alternatives, are depicted in Figure 3.2-1, “Geologic Formations in the Project Area.” The project area is in the eastern portion of the Sacramento Valley, and the Segment 2 project site lies within the floodplains of the Feather and Yuba Rivers. The natural floodplain of these rivers is wide in this area because the land is relatively flat. The floodplains are filled with Holocene-age alluvial deposits. These major drainage ways were originally confined within broad natural levees that sloped away from the rivers or streams. The natural levees formed through the deposition of alluvium during periods of flooding. As floodwaters lost energy, the coarser materials settled out nearest the rivers and streams, forming the natural levees and sand bars in the vicinity of the river channel. The finer material was carried in suspension farther from the rivers or streams, and settled out in quiet water areas such as swales, abandoned meander channels, and lakes. However, because the streams have meandered and reworked the previously deposited sediments, extreme variations in material types may be found over a limited distance or depth. The most recent deposits in these





Source: Saucedo and Wagner 1992

**Geologic Formations in the Project Area**

**Figure 3.2-1**

floodplains are sediments generated by hydraulic mining operations in the Sierra Nevada during the mid-1800s. These sediments cover portions of the floodplain outside the existing levees, with thickness estimated to range from 10 to 15 feet.

Flanking the recent alluvial deposits are late Pleistocene alluvial fan and terrace deposits of the Modesto and Riverbank Formations. Stream terrace deposits, mapped as the Modesto Formation, are higher in elevation and older than floodplain sediments. Before levees were built these stream terraces were flooded occasionally, but only small amounts of sediment were deposited during floods. The lower fan terraces of the Riverbank Formation are higher in elevation and older than stream terraces, and were flooded only rarely. (Additional information on these geologic formations is contained in Section 3.15, "Paleontological Resources.")

The existing Feather River levee and much of the Intermediate Setback Levee Alternative alignment overlie primarily Feather River channel deposits of Holocene age in the southern and central portion of Segment 2 and overlie areas of older Pleistocene-age Modesto formation in the northern portion of Segment 2 (Figure 3.2-1). Most of the setback levee alignment identified for the Applicant Preferred Alternative – ASB Setback Levee Alternative overlies the contact border between the Modesto Formation and the younger Holocene channel deposits.

The Holocene channel deposits in the project area are anticipated to be poorly consolidated, well-sorted sands, silts, clays, and gravels. These deposits occur as gravelly sand, silt, and clay from flood events along the Feather River and its tributaries. This unit overlies the older Pleistocene alluvium and ranges from 5 to 15 feet. Soils within the Modesto and Riverbank Formations are expected to be composed of a similarly wide range of materials, but slightly more consolidated, and these soils are expected to have higher shear strength and lower compressibility than the recent alluvial deposits (Yuba County Water Agency 2003a).

The *Soil Survey of Yuba County, California* (Natural Resources Conservation Service 1998) identifies a variety of soil map units in the FRLRP area. These units and their specific characteristics are described in detail in Appendix D of this EIS, "Geology and Soils Technical Data." The project area generally consists of deep soils derived from alluvial sources. The soils have low to high permeability rates that combined with the nearly level topography, result in low runoff rates and low risk of erosion.

## **Seismicity and Fault Zones**

The project area lies in east central California, an area that has historically experienced relatively low seismic activity. The project area is not located in an Alquist-Priolo Earthquake Fault Zone (California Geological Survey 1999, Hart and Bryant 1999). The closest major faults in the vicinity are listed in Table 3.2-1.

The nearest known active (Holocene or Historic) fault trace to the project area is the Dunnigan Hills fault, near the city of Woodland approximately 20 miles southwest of the project area (Jennings 1994). The Cleveland Hills fault, near Lake Oroville, is mapped approximately 40 miles north of the project area. The 1975 Oroville earthquake (5.7 Richter magnitude) caused surface rupture on portions of the Cleveland Hills fault.

The Prairie Creek fault joins with the Swain Ravine fault in southwestern Yuba County, and surface cracking was observed along this fault in Palermo following the 1975 Oroville earthquake. The Swain Ravine and Prairie Creek faults are considered capable of seismic activity, but the activity is estimated to have a long recurrence interval and a low slip rate (California Department of Water Resources 1979). Based on the California Seismic Hazard Map, a large-magnitude earthquake from either of these nearby seismic sources would produce an estimated maximum peak ground acceleration of 0.2 gravity (g) (equivalent to  $\pm 20\%$  of the earth's normal gravitational strength) in the project area. Actual surface response may differ depending on local soil conditions.

No evidence of faulting has been found at or near the project site during numerous geotechnical field investigations conducted in the project area.



**Table 3.2-1  
Faults in the Vicinity of the Project Area**

| Fault Name             | Age of Fault Activity <sup>1</sup> | Distance from Project Area |
|------------------------|------------------------------------|----------------------------|
| Willows Fault Zone     | Pre-Quaternary                     | 5 miles                    |
| Dunnigan Hills         | Holocene                           | 20 miles                   |
| Prairie Creek          | Historic                           | 25 miles                   |
| Swain Ravine           | Historic                           | 30 miles                   |
| Cleveland Hills        | Historic                           | 40 miles                   |
| Melones                | Pre-Quaternary                     | 40 miles                   |
| Bear Mountain          | Pre-Quaternary                     | 40 miles                   |
| Coast Range Fault Zone | Historic                           | 40 miles                   |

<sup>1</sup> Historic = activity within the last 200 years; Holocene = activity within the last 10,000 years; Pre-Quaternary = no evidence of fault activity within the last 1,600,000 years.  
Source: Jennings 1994

Potential seismic hazards resulting from a nearby moderate to major earthquake can generally be classified as primary and secondary. The primary effect is fault ground rupture, also called surface faulting. Because there are no active faults mapped across the project site by the California Geological Survey or the U.S. Geological Survey (USGS) and the project area is not located within an Alquist-Priolo Earthquake Fault Zone, fault ground rupture is unlikely. Common secondary seismic hazards include ground shaking, liquefaction, subsidence, and seiches. These hazards are discussed below.

### **Seismic Ground Shaking**

The *Probabilistic Seismic Hazard Assessment for the State of California* (Petersen et al. 1996), published by USGS and the California Division of Mines and Geology (CDMG), identifies seismic hazards based on a review of various site specific characteristics and historical seismicity throughout California. The results of these studies suggest that there is a 10% probability that the peak horizontal acceleration experienced at the FRLRP project site would exceed 0.2 g in 50 years. The California Building Standards Code sets 0.3 g as the threshold above which special structural design is necessary to accommodate potential ground movement.

### **Ground Failure/Liquefaction**

Liquefaction is a process by which water-saturated materials (soil, sediment, and certain types of volcanic deposits) lose strength and may fail during strong ground shaking, when granular materials are transformed from a solid state into a liquefied state as a result of increased pore-water pressure. This behavior is most commonly induced by strong ground shaking associated with earthquakes. In some cases, a complete loss of strength occurs and catastrophic ground failure may result. Factors determining the liquefaction potential are soil type, the level and duration of seismic ground motions, the type and consistency of soils, and the depth to groundwater.

The FRLRP project area has relatively shallow groundwater conditions. Unconsolidated sediments underlie the project area in layers of very loose or loose cohesionless soils (clean sand and silty sand). These materials, where saturated, may be susceptible to liquefaction immediately after strong earthquake shaking, which may induce damaging settlement and/or cracking of the levee. Such a situation is possible, but the probability that strong ground motion would coincide with or immediately precede high river levels is very low.

Three types of ground failure or collapse of soil structures commonly result from liquefaction, lateral spread, ground oscillation, and loss of bearing strength. Because the topography in the project area is level and the potential for seismic activity is considered low, the potential for lateral spread is also considered low. Because of the low probability of strong seismic ground shaking in the project area, the probability of ground oscillation is also low. The loss of bearing strength occurs below a structure when soil loses strength and liquefies, which causes the structure to settle and tip. If the structure is buoyant, it may float upward. The only structure included in the FRLRP is the relocation of Pump Station No. 3. The pump station would not be subject to human occupancy/habitation. Through proper site selection and implementation of the Uniform Building Code requirements, Pump Station No. 3 would not be subject to the effects of loss of bearing strength.

### ***Subsidence and Settlement***

Land surface subsidence can be induced by both natural phenomena and human activities. Natural phenomena include subsidence resulting from tectonic deformations and seismically induced settlements; soil subsidence caused by consolidation, hydrocompaction, or rapid sedimentation; subsidence resulting from oxidation or dewatering of organically rich soils; and subsidence related to subsurface cavities. Human activities that can cause subsidence include withdrawal of subsurface fluids or sediments.

Pumping of water from subsurface water tables can be a cause of subsidence in California. For example, subsidence has created serious problems for flood control in the Sacramento-San Joaquin River Delta (Delta). Estimates in 1993 indicated that the Delta was subsiding at a rate of more than 3 inches per year. However, according to the *Yuba County General Plan* (Yuba County 1994), excessive groundwater extraction occurred from 1950 through 1984 within the valley area of Yuba County, but no concomitant land subsidence was recorded. Thus, it appears that subsidence from groundwater extraction should not be an issue in the project area.

Soil settlement could occur beneath setback levee embankments in Segment 2 because of an increase in overlying pressure from deposition and storage of a large volume of excavated soils. According to studies performed for the Yuba-Feather Supplemental Flood Control Project (Y-FSFCP) in support of preliminary design of the Feather River setback levee (Yuba County Water Agency 2003b), levee foundations in loose sand would likely settle up to several inches; levee foundation in clayey soils would be expected to settle for several years after completion. Differential settlement could cause cracking in embankments. A similar potential exists at potential borrow sites in the levee setback area as a result of hydro-compaction (compaction of soil after an initial wetting event) when these sites are later flooded.

### ***Seismic Seiches***

Earthquakes may affect open bodies of water in two ways: by creating seismic sea waves and by creating seiches. Seismic sea waves (often called “tidal waves”) are caused by abrupt ground movements (usually vertical) on the ocean floor in connection with a major earthquake. Because of the distance of the project area from the ocean, seismic sea waves are not likely to be a factor.

A seiche is a sloshing of water in an enclosed or restricted water body such as a basin, river, or lake, caused by earthquake motion. The sloshing can occur for a few minutes or several hours. A seiche in the project vicinity could be damaging, but based on the anticipated short duration of seismic ground shaking in Yuba County, the risk from seiches can be considered low. In addition, under most circumstances, flows in the Feather River are in the normal drainage channel, fairly distant from the flood control levees. For a seiche to affect anything other than the normal river channel and associated floodplain, a large seismic event of relatively long duration would need to occur concurrently with high water levels in the Feather River.

### 3.2.1.2 SOIL RESOURCES

Soil types and their distribution in the project area were identified through a review of maps provided by the Natural Resources Conservation Service. The soil map units found within Segment 2 are described in tables and figures included in Appendix D of this EIS, "Geology and Soils Technical Data." Information included in this appendix includes a detailed map of the surficial soils in the project area and a detailed summary of the physical and chemical characteristics of each soil type identified in the project area. As indicated in the impact discussions below in Section 3.2.2, "Environmental Consequences," geology and soils conditions potentially affecting the Applicant Preferred Alternative – ASB Setback Levee Alternative and other alternatives are primarily related to seismicity and subsurface geologic conditions. Surface soil conditions contribute little to the type or severity of environmental effects. Therefore, information on surface soil conditions is provided in Appendix D rather than the body of this EIS.

### 3.2.1.3 LEVEE CONDITIONS

Historically, levees along both the Feather River have experienced recurring and serious seepage problems during high river stages. Boils have been reported in fields on the land side of the levee. The existing levee was constructed before 1940. Over the last 50 years, the Corps has implemented various alterations to improve levee protection, including installation of relief wells, berms, drains, and slurry walls (see Chapter 1, "Purpose of and Need for Action," for details on Corps flood protection projects in the area).

Along the Feather River levee segment in the project area, levee heights range from 20 to 30 feet, and the levees are designed to pass the 1957 design profile with 3 feet of freeboard. Crown widths are approximately 20 feet or wider. Side slopes are generally 3:1 on the water side and 2:1 on the land side. Portions of the Feather River levee have berms of various heights and widths on the land side. The existing levees were constructed primarily of local soils. Foundation soils are similar. Groundwater levels have been measured at 6–16 feet below ground surface (Yuba County Water Agency 2003a).

### 3.2.1.4 MINERAL RESOURCES

In compliance with the California Surface Mining and Reclamation Act (SMARA), CDMG has established the classification system shown in Table 3.2-2 to denote both the location and significance of key extractive resources.

| <b>Table 3.2-2<br/>California Division of Mines and Geology Mineral Land Classification System</b> |                                                                                                                                                                    |
|----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Classification</b>                                                                              | <b>Description</b>                                                                                                                                                 |
| MRZ-1                                                                                              | Areas where adequate information indicates that no significant mineral deposits are present or where it is judged that little likelihood exists for their presence |
| MRZ-2                                                                                              | Areas where adequate information indicates that significant mineral deposits are present or where it is judged that a high likelihood for their presence exists    |
| MRZ-3                                                                                              | Areas containing mineral deposits, the significance of which cannot be evaluated from existing data                                                                |
| MRZ-4                                                                                              | Areas where available data are inadequate for placement in any other mineral resource zone                                                                         |
| Note: MRZ = Mineral Resource Zone<br>Source: Habel and Campion 1988                                |                                                                                                                                                                    |

Under SMARA, the State Mining and Geology Board may designate certain mineral deposits as being regionally significant to satisfy future needs. The Segment 2 area, including potential soil borrow areas, is classified as a MRZ-4 area for which available information is lacking or where available data are inadequate for placement in

any other mineral resource zone. According to Habel and Campion (1988), “Areas classified as MRZ-4 in the Yuba City-Marysville region have thick overlying soil layers which offer few rock exposures or are inaccessible.” Drill holes east of the existing Feather River levee within the area zoned MRZ-4, shown on Plate 7 of the Mineral Land Classification Map (Habel and Campion 1988), indicated that there is little likelihood of aggregate resources in this area.

The project site does not contain any land zoned MRZ-2 and is not shown in the *Yuba County General Plan* as an area of mineral resources to be protected from further development.

## **3.2.2 ENVIRONMENTAL CONSEQUENCES**

### **3.2.2.1 SIGNIFICANCE CRITERIA**

A project alternative would have a significant impact on geology, soils, and mineral resources if it would:

- ▶ expose persons or property to geologic hazards, such as ground shaking, liquefaction, landslides, land subsidence, or erosion;
- ▶ be located on a geologic unit or soil that is unstable or that would become unstable as a result of the project and potentially result in an on-site or off-site landslide, lateral spreading, subsidence, liquefaction, collapse, or other ground failure; or
- ▶ result in a loss of availability of a regionally or locally important mineral resource recovery site.

The Segment 2 area, including potential soil borrow areas, is classified as MRZ-4 (see discussion of “Mineral Resources” above); however, based on well log data east of the existing Feather River levee (Habel and Campion 1988, as well as data collected as part of planning for the Yuba-Feather Supplemental Flood Control Project [Y-FSFCP] and for the FRLRP), the project site does not contain a source of regionally or locally important mineral resources. Because the project would not result in a loss of mineral resources, no impact would occur, and this issue is not discussed further in this EIS.

### **3.2.2.2 METHODOLOGY**

Effects associated with geology and soils that could result from construction activities were evaluated qualitatively based on expected construction practices, materials, and locations, and the expected duration of project construction and related activities. Operations effects were also evaluated qualitatively based on anticipated flood operations as described previously. It was assumed that the design and construction of the proposed flood control facilities would meet or exceed applicable design standards for static and dynamic stability, secondary effects related to ground shaking, and seepage.

The following analysis addresses direct effects of the Applicant Preferred Alternative – ASB Setback Levee Alternative and other alternatives. Indirect effects of the Applicant Preferred Alternative and other alternatives are addressed in Chapter 4.0, “Cumulative and Growth-Inducing Effects.” For example, potential impacts related to unstable soils, soil erosion, and seismic activity resulting from development that could be facilitated by the Applicant Preferred Alternative and other action alternatives are discussed under Section 4.1.2.4, “Geology, Soils, and Mineral Resources.” For an evaluation of the combined effects related to geologic conditions, soil erosion, and seismic hazards from implementation of past, present, and future projects in the region, see Section 4.2.4.2, “Geology, Soils and Mineral Resources.”

### **3.2.2.3 APPLICANT PREFERRED ALTERNATIVE – ASB SETBACK LEVEE ALTERNATIVE**

#### **AP Impact 3.2-a: Exposure of Persons or Property to Geologic Hazards, Such as Ground Shaking, Liquefaction, Landslides, Land Subsidence, or Erosion; Location on a Geologic Unit or Soil That Is Unstable or That Would Become Unstable as a Result of the Project**

The potential for water seepage problems to occur along the Feather River Segment 2 levee in the project area is created by discontinuous layers of clean sand found at varying depths. These conditions would be corrected by replacing the existing levee with a setback levee placed on superior foundation soils and constructed using modern engineering standards.

Both the existing levee and the proposed ASB setback levee could be subject to ground shaking from earthquakes in the faults at Oroville and within the Coast Range. The unconsolidated sediments on which the existing levees are founded include layers of very loose or loose cohesionless soils (clean sand and silty sand). These materials, where saturated, may lose strength during and immediately after strong earthquake shaking (the phenomenon referred to as soil liquefaction). In the unlikely event of strong earthquake shaking, liquefaction of loose foundation soils may induce damaging settlement and/or cracking of the levees. Replacement of the existing levee with a setback levee would result in the flood protection system having increased resistance to seismic events due to the setback levee being placed on foundation soils with less potential for liquefaction and the levee embankment being constructed with appropriate materials following modern engineering standards. Installation of the setback levee would ensure that the stability of the Feather River levee would be increased over existing conditions and that the risk of a levee failure from unstable soils and geologic conditions would be considerably lower than it is under current conditions. This would be a beneficial effect.

Static settlement of the proposed ASB setback levee foundation and embankment has been considered in the project design. To address the potential for settlement, where needed, overbuilding of the embankment is incorporated into the project design to avoid loss of freeboard over the long term. The design also acknowledges the potential for adjacent areas to settle at different rates or in different amounts under the embankment load and includes methods to prevent potential cracking from differential settlement and subsequent seepage or internal erosion during periods of high water levels.

Construction according to design recommendations by the geotechnical engineers, independent reviews of the project design and construction by a Board of Senior Consultants (BOSC), and engineering review and approval by the U.S. Army Corps of Engineers (Corps) and the Central Valley Flood Protection Board (CVFPB) would ensure the incorporation of appropriate features to address any potential structural instability of the ASB setback levee. These detailed investigations, design and construction reviews, and approval processes would ensure the incorporation of appropriate features to address any potential structural instability of the proposed ASB setback levee. In addition, the use of up-to-date engineering methods in the design and construction of the ASB setback levee would ensure that its stability would exceed that of the existing levee.

Construction activities associated with the Applicant Preferred Alternative – ASB Setback Levee Alternative would disturb earth, potentially resulting in accelerated erosion or an incidental release of sediment to adjacent lands or the Feather River. Ground-disturbing activities would include construction of the setback levee foundation, excavation of borrow areas, removal of Pump Station No. 3 and construction of a replacement pump station, degradation of the existing levee, and establishment of construction staging areas and access routes. However, these ground disturbances would be temporary. Erosion control measures would be implemented consistent with a Stormwater Pollution Prevention Plan (SWPPP) prepared as part of the National Pollutant Discharge Elimination System (NPDES) permit program. In addition, erosion control consistent with standards of the CVFPB as stated in Title 23, Sections 111–157 of the California Code of Regulations, would apply and stabilization of exposed soils on the setback levee surface would need to be complete by November 1 in a construction year. Therefore, construction of the Applicant Preferred Alternative would not result in any erosion conditions that would be considered hazardous to persons or property.

Lands within the levee setback area are currently protected by the existing Feather River left bank levee and are only exposed to floodwaters if there is a catastrophic levee failure. After construction of the proposed ASB setback levee and removal of portions of the existing levee in Segment 2, floodwaters passing through the levee setback area could erode soil that is not currently subjected to flood flows on a frequent basis. However, levee construction would increase the width and decrease the depth and velocity of flood flows in the levee setback area, minimizing erosive forces. In addition, vegetation cover in the levee setback area (agriculture or habitat) would reduce the potential for erosion. Erosive forces would not exceed the erosion resistance of the soils and vegetation in the setback area.

Based on the discussion above, the Applicant Preferred Alternative would not expose persons or property to geologic hazards, such as ground shaking, liquefaction, landslides, land subsidence, or erosion. In addition, the Applicant Preferred Alternative would not be located on a geologic unit or soil that is unstable or that would become unstable as a result of the project and potentially result in an on-site or off-site landslide, lateral spreading, subsidence, liquefaction, or other ground failure or collapse. Implementation of the Applicant Preferred Alternative would not result in significant adverse effects related to geology and soils.

#### **3.2.2.4 INTERMEDIATE SETBACK LEVEE ALTERNATIVE**

##### **ISL Impact 3.2-a: Exposure of Persons or Property to Geologic Hazards, Such as Ground Shaking, Liquefaction, Landslides, Land Subsidence, or Erosion; Location on a Geologic Unit or Soil That is Unstable or That Would Become Unstable as a Result of the Project**

Impacts related to geology, soils, and mineral resources under the Intermediate Setback Levee Alternative would be almost identical to those described above for the Applicant Preferred Alternative – ASB Setback Levee Alternative, with the exception of the beneficial effect of increased resistance to seismic events. The Intermediate Setback Levee Alternative places approximately one-half of the setback levee alignment on Holocene age geologic formations and approximately one-half on the Pleistocene Modesto formation. The Applicant Preferred Alternative – ASB Setback Levee Alternative places less than one-third of the setback levee alignment on Holocene age geologic formations and more than two-thirds of the alignment on the Pleistocene Modesto formation. The Pleistocene Modesto formation is less susceptible to liquefaction and other adverse seismic effects, and therefore the Applicant Preferred Alternative provides increased use of this superior levee foundation substrate.

Holocene age geologic formations are also more prone to seepage than the Modesto formation. Additional engineering measures would be required in the Intermediate Setback Levee design to account for the increased potential for underseepage through the levee foundation. However, the existing levee in Segment 2 is constructed entirely on similar Holocene age geologic formations and has historically experienced underseepage problems. The Corps has made many attempts to repair the levee through installation of relief wells, construction and enlargement of a seepage berm, and installation of a slurry cutoff wall. These repairs have not been completely successful in controlling the seepage problem. As a result, some degree of uncertainty exists as to whether constructing a setback levee over significant reaches of the Holocene age formation would meet the primary flood protection objective over the long term without further project modifications or improvements if underseepage problems arise.

#### **3.2.2.5 LEVEE STRENGTHENING ALTERNATIVE**

##### **LS Impact 3.2-a: Exposure of Persons or Property to Geologic Hazards, Such as Ground Shaking, Liquefaction, Landslides, Land Subsidence, or Erosion; Location on a Geologic Unit or Soil That is Unstable or That Would Become Unstable as a Result of the Project**

The potential for water seepage problems to occur along the Feather River levee in the project area is created by discontinuous layers of clean sand found at varying depths. The existing levee is located above a historical



channel of the Feather River. The materials in this historical channel include gravel overlain by silt and fine sand deposits. The gravel layers are pervious to water and are connected to gravel layers under the current Feather River. During high-water events, water from the river can enter the pervious gravel layers and then move laterally through these layers and under the levee. These conditions would be corrected under the Levee Strengthening Alternative by implementing proposed levee repairs and improvements, which would consist of construction of slurry cutoff walls, installation of relief wells, raising and/or constructing seepage/stability berms at various locations, and correcting identified waterside erosion problem areas. Cutoff walls and relief wells intercept the shallow sand layers and form an underseepage barrier or relieve the internal seepage pressure. Seepage berms provide additional overburden at the landside levee toe while allowing the seepage pressures to dissipate at gradients below the project criteria. (See Section 2.2.2.2 “Applicant Preferred Alternative – ASB Setback Levee Alternative,” in Chapter 2, “Alternatives,” for further detail on hydraulic gradient.)

In addition to seepage, the existing levees could be subject to ground shaking from earthquakes in the faults at Oroville and within the Coast Range. The unconsolidated sediments on which the levees are founded include layers of very loose or loose cohesionless soils (clean sand and silty sand). These materials, where saturated, may lose strength during and immediately after strong earthquake shaking (the phenomenon referred to as soil liquefaction). In the unlikely event of strong earthquake shaking, liquefaction of loose foundation soils may induce damaging settlement and/or cracking of the levees. Such a situation is possible, but the probability that strong ground motion would coincide with or immediately precede high river levels is very low. The susceptibility of existing levees to seismic events, as well as seepage, is part of the existing condition, and the proposed levee repair and strengthening activities would not result in the construction of facilities or structures that would present a unique hazard to people or property, nor would it alter the probability or potential intensity of seismic events in the project area.

Based on the discussion above, the Levee Strengthening Alternative would not expose persons or property to geologic hazards such as ground shaking, liquefaction, land subsidence, or other ground failure or collapse. Relative to existing conditions, implementation of the levee repairs and strengthening under this alternative would make the existing levees less susceptible to seepage, the levees would be stronger overall, and there would be a marginal increase in resistance to damage from a strong seismic event where more soil is added to the levee as part of seepage/stability berms. The use of up-to-date engineering methods would ensure that the stability of the Feather River levee would be increased over existing conditions and that the risk of a levee failure from unstable soils and geologic conditions would be considerably lower than it is under current conditions. This would be a beneficial effect, but would not provide the same level of improvement as the Intermediate Levee Setback or Applicant Preferred Alternatives due to the levee alignment remaining entirely on river channel deposits. The existing levee in Segment 2 has historically experienced underseepage problems, and the Corps has made many attempts to repair the levee through installation of relief wells, construction and enlargement of a seepage berm, and installation of a slurry cutoff wall. These repairs have not been completely successful in controlling the seepage problem. As a result, a degree of uncertainty exists as to whether repairing and strengthening the existing levee along Segment 2 would meet the primary flood protection objective over the long term; and the level of the overall beneficial effect is difficult to gauge.

Construction activities associated with the Levee Strengthening Alternative would disturb earth, potentially resulting in accelerated erosion or an incidental release of sediment to adjacent lands or the Feather River. Ground-disturbing activities would include temporarily cutting down the top of the existing levee to provide a work platform, excavating soils where slurry cutoff walls would be installed, and establishing construction staging areas and access routes. However, these ground disturbances would be temporary. Consistent with standards of the CVFPB as stated in Title 23, Sections 111–157 of the California Code of Regulations, work on the levee and stabilization of exposed soils on the levee surface would need to be complete by November 1 in a construction year. In addition, temporary erosion/runoff control measures would be implemented during construction as part of a SWPPP to minimize potential stormwater pollution from the construction areas. Therefore, construction of the Levee Strengthening Alternative would not result in any erosion conditions that would be considered hazardous to persons or property.

### **3.2.2.6 No-ACTION ALTERNATIVE**

If no permissions were granted to alter the existing levee or discharge dredged or fill material into waters of the United States, no extensive work would be undertaken that would require altering existing landforms or disturbing large areas of ground in the Segment 2 project area. Under these conditions, heavy underseepage and loss of foundation soils would be expected to continue and the threat of another levee failure would remain. Under the No-Action Alternative, it is possible that localized levee repairs (e.g., correction of identified waterside erosion sites) could be authorized under the federal Clean Water Act (CWA) Nationwide Permit (NWP) #3. This level of repair activities on the existing levee would not result in any significant impacts related to soils and geologic conditions. Any levee repair work that was implemented under NWP #3 could potentially require submittal of a Notice of Intent to the Central Valley Regional Water Quality Control Board and preparation of a SWPPP.

If no action was taken to completely repair this deficient levee segment, a levee failure could result in severe damage to local soils, especially those nearest the failure location, and could leave areas of scour holes and eroded and unstable landforms. The beneficial effect of reduced risks from geological hazards associated with improved levee protection under the Applicant Preferred Alternative – ASB Setback Levee Alternative and other action alternatives would not occur under the No-Project Alternative.

### **3.2.3 MITIGATION**

No significant impacts related to geology and soils are identified above and no mitigation measures are required.

### **3.3 SURFACE AND GROUNDWATER HYDROLOGY AND GEOMORPHOLOGY**

The following analysis addresses direct effects of the Applicant Preferred Alternative – Above Star Bend (ASB) Setback Levee Alternative (also referred to as the “Applicant Preferred Alternative”) and other alternatives. Indirect effects of the Applicant Preferred Alternative and other alternatives are addressed in Chapter 4.0, “Cumulative and Growth-Inducing Effects.” For example, for an evaluation of the effects of increased stormwater runoff resulting from development potentially facilitated by the Applicant Preferred Alternative and other action alternatives, see Section 4.1.2.5, “Hydrology, Water Supply and Quality, and Drainage.” For an evaluation of the effects of both of the setback levee alternatives on flood stage elevation when combined with other past, present, and future flood control projects in the region (e.g., the proposed Feather River Setback Levee at Star Bend Project), see Section 4.2.4.3, “Water Resources and River Geomorphology.”

#### **3.3.1 EXISTING CONDITIONS**

##### **3.3.1.1 HYDROLOGY AND FLOOD CONTROL**

###### **Primary Drainages**

The Reclamation District (RD) 784 area of Yuba County is bounded by the Yuba River on the north, the Feather River on the west, the Bear River on the south, and the Western Pacific Interceptor Canal (WPIC) on the east. The Yuba River is a tributary to the Feather River, and the WPIC connects with the Bear River upstream of the confluence with the Feather River. These drainages are briefly described below, followed by a summary of seasonal flows in the Yuba and Feather Rivers.

###### ***Yuba River***

The Yuba River drains the western slope of the Sierra Nevada and flows generally southwesterly to its confluence with the Feather River at Marysville (see Figure 1-2, “Regional Setting,” in Chapter 1). The main stem of the Yuba River forms at the juncture of the Middle and North Yuba Rivers just south of New Bullards Bar Reservoir and is joined by the South Yuba River just a few miles downstream near Bridgeport in Nevada County, approximately 1 mile east of Yuba County. The North Yuba River above New Bullards Bar Dam drains approximately 489 square miles. Large portions of the Yuba River drainage (Middle and South Forks) are largely unregulated with respect to flood flows. The main stem of the Yuba River in the Marysville vicinity drains approximately 1,390 square miles.

###### ***Feather River***

The Feather River and its main tributaries are shown in Figure 1-2 in Chapter 1. The Feather River drains an area of approximately 5,500 square miles at its confluence with the Bear River and 3,611 square miles above Oroville Dam in Butte and Plumas Counties. Between Oroville and Marysville, the Feather River drains an area of 369 square miles, flowing southerly through relatively flat or gently rolling terrain for 39 miles. North and South Honcut Creeks are principal tributaries to the Feather River between Marysville and Oroville and drain about 78 square miles of lower foothill and valley areas east of the Feather River. Jack and Simmerly Sloughs, also tributaries to the Feather River, are bordered by levees in places to confine them to their channels during flood events. The sloughs drain approximately 55 square miles north of Marysville between the left (east) bank levee of the Feather River and the right (north) bank levee of the Yuba River. Most of the area drained by the sloughs is rice-growing land that is seasonally flooded.

## ***Bear River***

The headwaters of the Bear River are in the vicinity of Emigrant Gap and Lake Spaulding. The Bear River flows generally southwesterly to a point approximately 8 miles north of Auburn, where it turns more westward to its confluence with the Feather River in the vicinity of Nicolaus. Elevations within the Bear River basin range from about 125 feet above mean sea level (msl) to more than 5,700 feet msl. Major tributaries to the Bear River are Greenhorn, Wolf, Rock, and Dry Creeks. The entire drainage of the Bear River is approximately 550 square miles (Yuba County Water Agency 2003b). Figure 1-2 shows the middle and lower reaches of the Bear River.

Major importation of water to the Bear River watershed occurs near its headwaters. Some irrigation spill and ditch seepage enters from the ridge between the South Yuba and Bear Rivers. Exports from the Bear River watershed are made through the conveyance facilities of Nevada Irrigation District and Pacific Gas and Electric Company. These diversions include nearly all the imported water and some of the natural flow. The diverted water is used for irrigation, power generation, and domestic supply in the Auburn area. The net effect of the upstream uses, exports, and imports in the Yuba and Bear River basins has been to deplete the streamflow at the base of the foothills. In recent years, the average amount diverted has been more than 44,000 acre-feet (af) seasonally. This amount primarily affects the Yuba River at Smartville; the average depletion of the Bear River above Wheatland is relatively minor because of the imports of water farther upstream from the Yuba River basin.

## ***Western Pacific Interceptor Canal***

The WPIC was constructed as part of the Sacramento River Flood Control Project (SRFCP). The WPIC runs north-south on the east side of State Route (SR) 70 from approximately 2 miles south of the SR 70/SR 65 interchange to the Bear River near Rio Oso. Water enters the WPIC from several sources. The Olivehurst Detention Basin stores interior runoff from south Olivehurst before releasing it to the WPIC. When water levels reach certain heights in the detention basin, pumps are automatically activated which begin to drain the detention basin into the WPIC. Clark Lateral drains into the Olivehurst Detention Basin. The Linda Drain and the Olivehurst Interceptor Canal convey flows to Reeds Creek, and the flows in the WPIC are derived primarily from Reeds and Hutchinson Creeks and Best Slough. Agricultural runoff presumably also contributes flows to the WPIC. The WPIC also receives backwater from the Bear River.

## **Feather and Yuba River Flows**

The Feather and Yuba Rivers have similar seasonal distributions of flows. As shown in Table 3.3-1, “Average Mean, Maximum, and Minimum Monthly Flows (cfs) on the Feather and Yuba Rivers,” the mean monthly flows are greatest in winter and early spring (January through March) and are at a minimum in late summer and early fall (July through October). The effects of reservoir storage capacity on flows are noticeable in extreme water years. The Feather River has nearly uniform flows in different year types because of the very large storage capacity of Lake Oroville; however, Yuba River flows are greatly reduced in very dry years because of the more limited carryover storage capacity of Bullards Bar Reservoir. During wet periods, the maximum monthly flow in the Feather River is often less than the maximum flow on the Yuba River, even though the Feather River watershed is more than three times the size of the Yuba River watershed, because the large storage volume of Lake Oroville can more effectively attenuate high flows.

## **Major Reservoirs**

The major reservoirs with a role in flood control operations for the project area are Lake Oroville on the Feather River and New Bullards Bar Reservoir on the North Yuba River (see Figure 1-2). Other reservoirs in the Yuba-Feather River watershed include Lake Almanor on the North Fork of the Feather River, Englebright Reservoir on the Yuba River, and Merle Collins and Slate Creek Reservoirs. Most of these reservoirs were created for the primary purpose of hydroelectric power generation, although they often fulfill several purposes, including flood control, water supply, and recreation.

| <b>Table 3.3-1</b><br><b>Average Mean, Maximum, and Minimum Monthly Flows (cfs) on the Feather and Yuba Rivers</b> |       |       |        |        |        |        |        |       |       |       |       |       |
|--------------------------------------------------------------------------------------------------------------------|-------|-------|--------|--------|--------|--------|--------|-------|-------|-------|-------|-------|
|                                                                                                                    | Oct   | Nov   | Dec    | Jan    | Feb    | Mar    | Apr    | May   | Jun   | Jul   | Aug   | Sep   |
| <b>Feather River at Oroville, USGS Gauge 11407000 (1969–2005)</b>                                                  |       |       |        |        |        |        |        |       |       |       |       |       |
| Mean                                                                                                               | 571   | 734   | 1,120  | 2,760  | 2,090  | 1,890  | 949    | 747   | 531   | 538   | 526   | 518   |
| Maximum                                                                                                            | 1,580 | 3,310 | 7,730  | 26,750 | 25,180 | 18,870 | 7,060  | 7,920 | 1,000 | 770   | 800   | 660   |
| Minimum                                                                                                            | 400   | 400   | 390    | 400    | 400    | 400    | 400    | 390   | 410   | 400   | 390   | 390   |
| <b>Yuba River near Marysville, USGS Gauge 11421000 (1970–2005)</b>                                                 |       |       |        |        |        |        |        |       |       |       |       |       |
| Mean                                                                                                               | 1,070 | 1,320 | 2,320  | 4,090  | 4,330  | 4,280  | 2,880  | 2,530 | 1,970 | 1,310 | 1,440 | 1,240 |
| Maximum                                                                                                            | 2,370 | 4,480 | 11,430 | 26,180 | 20,970 | 15,100 | 14,280 | 9,720 | 8,630 | 3,740 | 2,830 | 2,900 |
| Minimum                                                                                                            | 130   | 180   | 370    | 230    | 210    | 190    | 170    | 170   | 150   | 90    | 70    | 90    |
| Notes: cfs = cubic feet per second; USGS = U.S. Geological Survey<br>Source: U.S. Geological Survey 2006           |       |       |        |        |        |        |        |       |       |       |       |       |

Lake Oroville, owned and operated by the California Department of Water Resources (DWR), is the largest reservoir in the State Water Project and is the primary flood control feature on the Feather River. Lake Oroville captures runoff from a 3,611-square-mile watershed. At elevation 900 feet msl, the reservoir provides a full pool of 3,538,000 af of storage, up to 750,000 af of which is required for flood control. The reservoir inundates 15,800 acres at this elevation. Power is generated at the Hyatt Pumping-Generating Plant and Thermalito facilities downstream of Oroville Dam. Thermalito Afterbay has 45,000 af of storage space for water deliveries to local districts and for regulation of power releases from Oroville Dam and a maximum outflow of 17,000 cubic feet per second (cfs). Flood control operations for the reservoir are described in detail in the Yuba-Feather Supplemental Flood Control Project (Y-FSFCP) draft environmental impact report (DEIR) (Yuba County Water Agency 2003a).

New Bullards Bar Reservoir is owned and operated by Yuba County Water Agency (YCWA) and is the principal flood control reservoir on the Yuba River system. The reservoir is on the North Yuba River just above its confluence with the Middle Yuba River. New Bullards Bar Reservoir drains a watershed of 489 square miles, which is only 37% of the total Yuba River drainage area. At elevation 1,956 feet msl, the reservoir provides a full pool of 960,000 af of storage, up to 170,000 af of which is required for flood control. The reservoir inundates 4,790 acres at this elevation. Power is generated at the New Colgate Powerhouse, which has a maximum outflow of 3,500 cfs. Flood control operations for the reservoir are described in detail in the Y-FSFCP DEIR (Yuba County Water Agency 2003a).

### Existing Flood Control Conditions for RD 784

Lake Oroville and New Bullards Bar Reservoir, as well as an extensive system of levees, provide flood control along the Feather and Yuba Rivers. Release volumes from Lake Oroville and New Bullards Bar Reservoir depend on the combined flows of the Feather and Yuba Rivers downstream of Marysville.

### Design Flows

The SRFCP includes U.S. Army Corps of Engineers (Corps) specified design capacities for channels in the project area and flood control operation rules for Lake Oroville and New Bullards Bar Reservoir, including design target flows for the Feather and Yuba Rivers. The maximum design target flows for the levee system that protects RD 784 are shown in Table 3.3-2, along with the design-flow frequency, expressed in terms of the annual exceedance probability (AEP). The AEP is the probability that a given flow will be exceeded in any year; for

example, an AEP of 1 in 125 has a 1-in-125, or 0.8%, probability of being exceeded in any year. Lake Oroville and New Bullards Bar Reservoir are operated to maintain flood flows at or below the flows shown in Table 3.3-2. The reservoirs fill and lose flood management capability at about the 1-in-150 AEP flood.

| <b>Table 3.3-2<br/>Design Target Flows for Various Levees in the Project Vicinity</b>                                                                                      |                                                     |                                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|------------------------------------|
| <b>River</b>                                                                                                                                                               | <b>Design Flow</b>                                  | <b>Design-Flow Frequency (AEP)</b> |
| Yuba River                                                                                                                                                                 | 120,000–180,000 cfs depending on Feather River flow | Less frequent than 1 in 125        |
| Feather River between Yuba River and Bear River                                                                                                                            | 300,000 cfs                                         | Less frequent than 1 in 125        |
| Bear River at mouth                                                                                                                                                        | 40,000 cfs                                          | Less frequent than 1 in 50         |
| WPIC                                                                                                                                                                       | Backwater from Bear River                           | NA                                 |
| Feather River below Bear River                                                                                                                                             | 320,000 cfs                                         | Less frequent than 1 in 100        |
| Notes: AEP = annual exceedance probability; cfs = cubic feet per second; NA = not applicable; WPIC = Western Pacific Interceptor Canal<br>Source: Trieu, pers. comm., 2006 |                                                     |                                    |

### ***Levee Conditions—Feather River Left (East) Bank Levee***

The Feather River left bank levee from the confluence with the Yuba River to the confluence with the Bear River was initially constructed in the early 1900s. The levee failed frequently before the 1930s. To create a safer condition, the Corps set back a substantial portion of the levee and strengthened some reaches. This work was completed between 1936 and 1941. Additional strengthening of the levee took place in the 1960s because significant seepage was evident during the 1955 flood. Additional weak areas in the levee were identified following the 1986 flood. In 1997, before these weak areas could be completely repaired, the levee failed across from Country Club Avenue to the north of Star Bend, in what is now FRLRP Segment 2 (see Figure 1-3 in Chapter 1, “Purpose of and Need for Action”).

The Corps has performed additional levee strengthening since the 1997 flood. The final contract for the Corps’ System Evaluation Site 7 Extension project was completed in 2004 (see Chapter 1 for a description of Corps flood protection projects in the project area). Subsequent study has indicated underseepage, through-seepage, and erosion problems with the Segment 2 levee, resulting in the need for additional repairs.

### **3.3.1.2 GROUNDWATER**

#### **General Conditions**

The principal aquifers in the valley area of Yuba County consist of as much as 100 feet of Pleistocene sands and gravels overlain by as much as 125 feet of recent alluvial fan, floodplain, and stream channel deposits. The pre-Eocene formations in the valley area of Yuba County have relatively low permeability and are moderate water producers (Yuba County 1994). Natural groundwater levels can vary substantially from year to year and seasonally. Groundwater levels are generally higher in winter and spring. The valley areas along the Feather River generally serve as groundwater recharge areas.

#### **Groundwater Conditions in the Project Area**

The project area is in the southern portion of the Sacramento River hydrologic region and is located within the South Yuba subbasin (California Department of Water Resources 2003). In recent years, under relatively normal conditions, groundwater elevations in the South Yuba subbasin have ranged from about 150 feet in the northwest



region of the basin, to about 30 feet in the southwest corner near the confluence of the Feather and Bear Rivers (California Department of Water Resources 2003).

The levee setback areas being considered for Segment 2 are expected to have relatively shallow groundwater conditions (groundwater table generally less than 20 feet deep), as the nearby perennial flows of the Feather and Yuba Rivers provide ready recharge. Based on available topographic maps, the water surface elevation in the Feather River channel is estimated to range from approximately 34 feet at the north end of the project area to 20 feet at the south end (Yuba County Water Agency 2003b). However, flow levels in the channel can vary considerably depending on the volume of natural flow and releases from upstream dams.

Depending on local variations in the horizontal hydraulic continuity of the soil, groundwater levels near the river's edge and along the existing levees may be similar to river surface flow elevations, with a slight hydraulic gradient downward away from the rivers (and other sources of recharge, such as agricultural drainage). However, groundwater levels also vary seasonally with precipitation and runoff in this area and may rise closer to the ground surface during wet years. In addition, groundwater levels are influenced locally by pumping as the groundwater is withdrawn regularly during spring and summer for irrigation, and throughout the year for general use by most of the local growers (Yuba County Water Agency 2003b).

In exploration borings performed in recent years groundwater has been found to be 6–16 feet below the natural ground surface along the Feather River levee. Test borings along the setback levee alignments being considered in Segment 2 indicate that the elevation of the groundwater table varies from approximately 19 feet to 31 feet along the length of the alignments. In general, groundwater elevations appeared to drop slightly from north to south (Yuba County Water Agency 2003b).

### **3.3.1.3 LOCAL DRAINAGE**

Drainage in the northern half of Segment 2 is generally directed southwest, angling towards the existing Feather River levee. In much of the area west of the setback levee alignments being considered, drainage water is collected in a canal identified as Lateral 6 and conveyed to Messick Lake and several unnamed shallow water bodies (visible on Figure 2-1). An additional drainage canal identified as Lateral 7/8 crosses the setback levee alignments being considered at Anderson Avenue via a buried culvert and empties from the east into Lateral 6 north of these water bodies. The Plumas Lake Canal, which collects drainage from several ditches east of the setback levee alignments being considered, crosses the alignments approximately 1,900 feet north of the southern end of Segment 2 (in an area where the alignments for the Applicant Preferred Alternative – Above Star Bend [ASB] Setback Levee Alternative [also referred to as the “Applicant Preferred Alternative”] and the Intermediate Setback Levee Alternative coincide) and empties into a pond. Water from Messick Lake and the pond is pumped out over the existing levee into the Feather River floodway at RD 794's Pump Station No. 3.

### **3.3.1.4 GEOMORPHOLOGY**

In its pristine condition, the Sacramento Valley was composed of perennial grasslands, riparian woodlands, and extensive marshes. The Sacramento River, Feather River, Bear River, and other primary waterways often would flood in winter and early spring, recharging wetlands and depositing fertile sediments on the floodplain that are now valued for agriculture. River channels were somewhat migratory, shifting through time. In places along the rivers, natural levees would form to just above flood levels.

Hydraulic mining conducted during much of the latter half of the 19<sup>th</sup> century washed immense quantities of sediments into Sierra Nevada streams. The effects of hydraulic mining were, and remain, particularly significant for the valley portions of Yuba County, especially in the Marysville vicinity, where the Feather and Yuba Rivers converge. Both of these river basins received huge sediment loads from hydraulic mining at their upper reaches. At the mouth of the Yuba River at the south edge of Marysville, 70 feet or more of sediment eventually filled the

river channel. Upstream of Marysville, entire communities were buried under more than 40 feet of silt and gravel (Hoover et al., 1990).

Levees were constructed along the Feather and Yuba Rivers and their tributaries to prevent the flooding of Marysville and surrounding valley communities. The levees also prevented these communities from becoming buried under the sediments that were washed down from the mountains. To continue to protect Marysville and the surrounding communities, levees were built ever higher to confine the floodwaters to a relatively narrow channel that would promote sediment transport. The SRFCP levees on the Feather and Yuba Rivers were designed to confine flows to a relatively narrow channel that would efficiently convey sediment through the system, reducing the amount of dredging necessary to maintain navigation. As a result, Marysville, Olivehurst, and Linda are now many feet below the floodwater levels of the Feather and Yuba Rivers.

As part of the Corps' Yuba River Basin Investigation (U.S. Army Corps of Engineers and State of California Reclamation Board 1998), sediment transport was evaluated with a numerical model (HEC-6) for very large flood flows (the "400-year" flood). The following were the main conclusions of the study:

- ▶ The main phase of channel degradation (downcutting) on the Feather River through the hydraulic mining debris had occurred by the mid-1960s. Further large-scale degradation is unlikely within an engineering time frame (50 years) because the base elevation of the channel is controlled by sedimentation from the Yuba and Bear Rivers.
- ▶ The Feather River has cut through the mining debris, but there have not been mass bank failures that could lead to channel migration that could ultimately threaten the levee system.
- ▶ The channel is stable because of the sediment supply to the Feather River from the Yuba and Bear Rivers.
- ▶ Eventual reduction in sediment delivery from the Yuba and Bear Rivers is likely to promote lateral migration of the Feather River in the future.

In summary, while hydraulic mining debris stored in the Feather, Yuba, and Bear River channels continues to supply sediment to the river system, the channels are expected to remain relatively stable. As sediment supplies decline, the rivers again will adjust to a new equilibrium. Ultimately (hundreds to thousands of years in the future), it is likely that the river channels will cut down to their premining elevations and will begin migrating laterally.

### **3.3.2 ENVIRONMENTAL CONSEQUENCES**

#### **3.3.2.1 SIGNIFICANCE CRITERIA**

A project alternative would have a significant direct impact on surface and groundwater hydrology and river geomorphology if its construction or operation would:

- ▶ substantially alter the existing drainage pattern of a site or area;
- ▶ substantially increase the rate or amount of surface runoff;
- ▶ result in increased exposure of persons or private property to flood hazards;
- ▶ substantially reduce water supply; or
- ▶ alter regional or local hydrology, resulting in erosion of the levee system or substantial increases in the mobilization and/or deposition of sediments.

The following analysis addresses direct effects of the Applicant Preferred Alternative – ASB Setback Levee Alternative and other alternatives. Indirect effects of the Applicant Preferred Alternative and other alternatives are addressed in Chapter 4.0, “Cumulative and Growth-Inducing Effects.” For example, Section 4.1.2.5, “Hydrology, Water Supply and Quality, and Drainage,” includes a discussion of the effects of increased stormwater runoff resulting from development potentially facilitated by the Applicant Preferred Alternative and other action alternatives. An analysis of the effects of both of the setback levee alternatives on flood stage elevation when combined with other past, present, and future flood control projects in the region (e.g., the proposed Feather River Setback Levee at Star Bend Project) is included in Section 4.2.4.3, “Water Resources and River Geomorphology.”

### **3.3.2.2 MODELING OF HYDRAULIC EFFECTS**

Hydraulic effects of the Applicant Preferred Alternative – ASB Setback Levee Alternative, Intermediate Setback Levee Alternative, and Levee Strengthening Alternative were evaluated through modeling of a series of floods with different AEP levels in the project vicinity. The methods and results of the modeling are described in *Hydraulic and Hydrologic Analysis of the Three Rivers Levee Improvement Authority’s Phase IV Project – Feather River Levee Repair Project* (MBK Engineers 2006b). A complete copy of the hydraulic and hydrologic analysis is contained in Appendix E of this EIS.

For modeling purposes, the “Without Project” condition was the benchmark condition by which all hydraulic impacts were measured for the project alternatives. The “Without Project” condition was represented in the modeling by the existing condition (channel vegetation and geometry, top-of-levee elevations) of the flood control system, except in a few locations along the Bear River and Yankee Slough where data show that the levees are below the 1957 design criteria. At these locations, the “Without Project” condition was represented by the 1957 design profile levee elevation (1957 design water surface + 3 feet of freeboard). In other words, the top-of-levee elevations that were found to be below design specifications were assumed to be restored to their original specified design elevations. The state and local districts have a requirement to maintain the project design levee grade, and once they become aware of a project deficiency, they must take action to correct that deficiency (see *Standard Operations and Maintenance Manual for the Sacramento River Flood Control Project*, dated May 1955, Section IV, paragraphs 4-02 and 4-04). The state and local districts are aware of these project deficiencies and are expected to restore levees to specified design elevations in the near future (Countryman, pers. comm., 2007).

The Applicant Preferred Alternative – ASB Setback Levee Alternative, Intermediate Setback Levee Alternative, Levee Strengthening Alternative, and the “Without Project” condition were evaluated using state-of-the-art hydraulic models and hydrology data obtained from the Corps. The 1-in-100 and 1-in-200 AEP floods were routed through Lake Oroville and New Bullards Bar Reservoir for hypothetical storms centered over either the Feather River or Yuba River watershed. The resultant flows were routed through the flood system down to the location of Verona, on the Sacramento River immediately downstream of the confluence with the Feather River. Water surface profiles were calculated for each flood event and for each alternative. The Shanghai-Yuba centering (i.e., location in the hydrologic model where a storm is focused) provided the highest water surface elevations along the Feather and Yuba Rivers and also along the lower Bear River. The water surface profiles were calculated based on an assumption that levees would overtop but would not fail. This assumption ensures the worst-case (highest) water surface profile for any given flood. This is also the condition that the downstream levee system has a reasonable probability of experiencing during an extreme flood because levees are not designed to fail for a water surface elevation lower than the top of the levee.

### 3.3.2.3 APPLICANT PREFERRED ALTERNATIVE – ASB SETBACK LEVEE ALTERNATIVE

#### **AP Impact 3.3-a: Alter Regional or Local Hydrology, Result In Erosion of the Levee System, or Substantially Increase the Mobilization and/or Deposition of Sediments**

##### ***Flood Hydrology***

##### **Local and Upstream Effects**

The setback levee included in the Applicant Preferred Alternative – ASB Setback Levee Alternative is designed to (1) decrease flood stages in the Feather River between Shanghai Bend and Star Bend by increasing the channel width and, therefore, channel capacity; and (2) provide a well-designed, well-constructed levee using up-to-date technology. Lowering flood stages along this part of the Feather River channel would also reduce the backwater effects on flood stages upstream in both the Feather and Yuba Rivers. Changes in hydraulic and hydrologic conditions would only occur after the existing levee is degraded and floodwaters can enter the setback area.

Hydraulic simulations conducted for the FRLRP indicate that the Applicant Preferred Alternative would lower water levels in the Feather River upstream of Star Bend (MBK Engineers 2006b). For the 1-in-100 and 1-in-200 AEP events, it was determined that the Applicant Preferred Alternative would lower the water level at the confluence of the Feather and Yuba Rivers by 1.3 feet and 1.6 feet, respectively. The presence of the proposed setback levee and related changes in upstream water levels would not affect the Lake Oroville or New Bullards Bar Reservoir dams.

TRLIA and DWR do not propose to increase the objective flow on the Feather River. Lowering flood stages and replacing the existing levee with a well-designed, well-constructed levee built using up-to-date construction standards would reduce the potential for levee failures in this channel segment that has historically been plagued by levee instability and failures. Effects of the levee setback on local flood protection would be beneficial.

##### **Downstream Effects**

The Applicant Preferred Alternative – ASB Setback Levee Alternative would increase flood storage capacity along the Feather River channel once the existing levee segment is degraded and completely or partially removed. Under most conditions, this would help attenuate downstream flows. However, because the setback levee would result in lower water levels upstream, flows in the Feather River just downstream of the setback levee would increase slightly. The hydraulic simulations indicate that the Feather River peak flow just downstream of the setback levee under a 1-in-100 AEP event would increase from 271,938 cfs to 272,406 cfs, an increase of less than 1% (MBK Engineers 2006b). The slight increase in flows would increase water surface elevation by 0.02 foot in the Feather River from the southern end of the setback levee alignment to the confluence with the Bear River. There would be no measurable increase in flood stage elevations downstream of the Bear River. For the 1-in-200 AEP event, the flows would increase from 347,031 cfs to 348,879 cfs, an increase of less than 1%. The water surface elevation in the Feather River from the southern end of the setback levee alignment to the confluence with the Bear River would increase by 0.08 foot as a result of the increased flow. Again, there would be no measurable increase in flood stage elevations downstream of the Bear River. The stage for the design flow remains below the project design stage (“1957 design profile”) for the entire Feather River reach below the setback levee.

It should be noted that the hydraulic model used for this analysis does not take into account the planned Forecast-Coordinated Operations (F-CO) of Lake Oroville and New Bullards Bar Reservoir included as part of the Y-FSFCP. The F-CO element of the Y-FSFCP is a cooperative planning and model development process that is directed toward strengthening flood control operations for the Yuba and Feather Rivers by improving flood forecasts, closely coordinating the flood operations of Lake Oroville and New Bullards Bar Reservoir, improving operational procedures, and providing for improved communication and real-time forecast information to

reservoir operators and downstream emergency managers (Yuba County Water Agency 2003a). With implementation of the F-CO, any increases in downstream flood stage elevations associated with implementation of the Applicant Preferred Alternative – ASB Setback Levee Alternative would be less than what is described above.

Another element of potential downstream impacts is whether construction of the Applicant Preferred Alternative – ASB Setback Levee Alternative could represent an unacceptable transfer of flood risk to adjacent or downstream levee districts is the reduction in frequency in which flood waters enter the RD 784 area. This could potentially create some degree of risk that flood water may be redirected to another basin upstream or downstream of the protected area. The question is whether the impacts of such risk shifting are significant and warrant compensatory measures outside of RD 784. The existing FRLRP Segment 2 levee has been determined to have geotechnical deficiencies which would be addressed by the Applicant Preferred Alternative – ASB Setback Levee Alternative. The correction of levee deficiencies that could cause a levee failure at less than the design flow must be completed. These actions do not represent a transfer of risk or an unacceptable impact to the flood control system because the system was intended to carry the design flow. An example of this condition would be erosion that has reduced the levee section. This erosion must be repaired and does not represent a transfer of risk or an unacceptable change from the existing condition. For this reason, the correction of existing project deficiencies also does not represent a transfer of risk or unacceptable change from the existing condition. The existing FRLRP Segment 2 levee also creates a narrow channel and construction of the Applicant Preferred Alternative – ASB Setback Levee Alternative would widen the floodway and open up a choke point in the Feather River, thus providing regional flood damage reduction benefits. Sutter County and Levee District 1 (across the river) and the Sacramento Area Flood Control Agency (SAFCA) (downstream) have issued letters of support for the Applicant Preferred Alternative because of these regional benefits. The Applicant Preferred Alternative – ASB Setback Levee Alternative would be built to modern engineering standards and would have a much lower probability of failure when compared to the existing deficient condition.

The levees in the SRFCP were built to a design stage commonly referred to as the “1957 design profile.” When the Corps transferred the SRFCP to the State of California for operation and maintenance, the Corps concluded that the levees met all engineering standards to pass the design flow at the design stage. This is documented in the 1953 Memorandum of Understanding (MOU) between the Corps and the Reclamation Board (on behalf of the State of California). The Reclamation Board (now the CVFPB) is required to maintain the SRFCP levees to this condition. However, based on application of current engineering standards for levee design and consideration of new geotechnical data for the SRFCP, it is clear that many of the SRFCP levees, including the FRLRP Segment 2 levee, do not meet current engineering standards at the “1957 design profile.”

The common method of assessing transfer of risk is a hydraulic impact analysis. This analysis has been conducted for the Applicant Preferred Alternative – ASB Setback Levee Alternative and is included in Appendix E of this EIS. The analysis demonstrated that at the “1957 design profile” the only upstream impacts are beneficial (through the reduction of water surface elevations). The analysis also demonstrated that at the “1957 design profile” there are no significant impacts downstream.

TRLIA’s design standard is the 200-year water surface elevation. In the FRLRP Segment 2 area there is no substantive difference between the 200-year water surface elevation and the “1957 design profile” (see Appendix E, 1997 Technical Memorandum, Figure 4). This is because the “1957 design profile” was computed before the construction of Oroville and New Bullards Bar dams and before the enlargement of the Feather River channel that resulted from the erosion of hydraulic mining debris deposited over 100 years ago. Because of these changes, the Feather River currently has a higher level of protection at the “1957 design profile” (once the levees are made secure) than other portions of the SRFCP. The Applicant Preferred Alternative – ASB Setback Levee Alternative lowers the water surface elevation for the “1957 design flow” and provides a beneficial impact to the SRFCP. The decreased risk of levee failure does not affect the intended performance of other parts of the SRFCP. The decreased risk of levee failure is consistent with the design intent of the SRFCP, which did not rely on upstream levee failures to protect downstream floodplains.

The simulated increases in downstream floodwater flows with the proposed setback levee are small (less than 1%), the increases in downstream flood stage elevation would be less than 1 inch for the 1-in-100 and 1-in-200 AEP events, the stage for the design flow would remain below the project design stage even with these minor increases, and there would not be a significant transfer of risk downstream. Implementation of the F-CO would further reduce the minor projected increases in downstream flows. These changes are not considered sufficient to result in increased exposure of persons or private property to flood hazards. Therefore, no significant adverse environmental effect would occur.

## **Geomorphic Processes**

### **Geomorphic Processes along the River Channels**

The following discussion addresses the potential effects of increases in shear stresses along the Feather River and Yuba River channels, shorelines, and floodways. Potential effects of increased shear stresses on the levee system are addressed below in the discussion of “Geomorphic Processes along the Project Levees.”

Implementation of the Applicant Preferred Alternative – ASB Setback Levee Alternative would increase the capacity of the Feather River floodway to convey flood flows. Increasing the conveyance area by increasing the floodplain width would decrease the depth and velocity of flood flows in this portion of the Feather River floodway. This decrease in velocity would result in a decrease in shear stresses along this part of the Feather River (Philip Williams & Associates 2006 [This document is included in Appendix C of the FRLRP EIR. As identified in Section 1.9, “Related Documents,” in this EIS, the FRLRP EIR is incorporated into the EIS by reference.]). Shear stress is an expression of the lateral force of water against the adjacent shoreline. Higher shear stresses typically indicate greater erosion potential. Therefore, the presence of the setback levee would be expected to lessen the potential for channel bed and bank erosion on the Feather River along FRLRP Segment 2.

The presence of the Applicant Preferred Alternative would have little effect on flow velocities and no effect on shear stresses downstream of the levee setback area. However, the increase in flood flow conveyance capacity in the levee setback area would increase flow velocities and erosion potential upstream of this area when flows are sufficient to inundate the levee setback area (greater than an approximately 3-year flow).

The degree of change in shear stress, and hence erosion potential, varies with the frequency and magnitude of flow events. To assess differences in shear stress between with- and without-project conditions, a shear stress index was developed that reflects the change in boundary shear stress and the frequency with which different flow events are likely to occur over a 100-year period. For example, the change in shear stress for a 4-year event is multiplied by 25 (number of occurrences in a 100-year period) and the change in shear stress for a 100-year event is multiplied by one. The sum of changes is divided by 100 (number of years in the evaluation period). The shear stress index is a measure of the cumulative change in erosive energy at a location over a 100-year period. The analysis divided reaches into units based on geomorphic processes or sensitivity to increases in shear stress. The reaches are: Yuba River through Marysville (approximately Project Levee Mile [PLM] 0.0–1.5), Feather River through Yuba City (approximately PLM 26.5–34.0), Feather River right bank at Shanghai Bend (approximately PLM 22.25–23.75), Feather River left bank downstream of Shanghai Bend (approximately PLM 17.75–22.0), Feather River knickzone where incision on the river bottom has currently held up on a cohesive layer (approximately PLM 22.25–22.75), Feather River levee setback reach (approximately PLM 17.2–23.4), Feather River right bank at Star Bend (approximately PLM 15.5–19.0), and Feather River downstream of Star Bend (approximately PLM 12.0–15.25). The shear stress indexes for each reach under existing conditions and after implementation of the Applicant Preferred Alternative and the Intermediate Setback Levee Alternative (discussed below) are provided in Table 3.3-3.

**Table 3.3-3  
Riverbank Shear Stress Indexes**

| Reach Location                                      | Shear Stress Index Value |                                                                             |                                        |
|-----------------------------------------------------|--------------------------|-----------------------------------------------------------------------------|----------------------------------------|
|                                                     | Existing Condition       | Applicant Preferred Alternative – Above Star Bend Setback Levee Alternative | Intermediate Setback Levee Alternative |
| Yuba River through Marysville                       | 0.11                     | 0.12                                                                        | 0.12                                   |
| Feather River through Yuba City                     | 0.29                     | 0.30                                                                        | 0.30                                   |
| Feather River right bank at Shanghai Bend           | 0.44                     | 0.48                                                                        | 0.47                                   |
| Feather River left bank downstream of Shanghai Bend | 0.54                     | 0.57                                                                        | 0.57                                   |
| Feather River knickzone                             | 0.28                     | 0.30                                                                        | 0.30                                   |
| Feather River levee setback reach                   | 0.58                     | 0.57                                                                        | 0.57                                   |
| Feather River right bank at Star Bend               | 0.53                     | 0.52                                                                        | 0.52                                   |
| Feather River downstream of Star Bend               | 0.37                     | 0.37                                                                        | 0.37                                   |
| Source: Phillip Williams & Associates 2006          |                          |                                                                             |                                        |

The analysis shows that along the levee setback area (including Star Bend), the Applicant Preferred Alternative would reduce the shear stress index by 2% relative to existing conditions (approximating a 2% reduction in erosive potential). In the reach around Shanghai Bend, the maximum shear stress index is increased by 9% (right bank bend) and 5% (left bank downstream of Shanghai Bend). In the knickzone, the maximum increase in the shear stress index is 7%. In the reaches through Yuba City and Marysville, the maximum increase in the shear stress index is 3–9%.

Based on these results, portions of the riverbanks along the Feather and Yuba Rivers where the shear stress index is predicted to increase could experience small amounts of new erosion or a slight acceleration of existing erosion.

However, because the increases in shear stresses are small, these increases could also result in no effects in areas where shoreline sediments are sufficiently cohesive or if the banks are stabilized by vegetation, riprap, or other means and can resist the increase in erosive potential. Although estimated increases in shear stresses could result in small amounts of new erosion or a slight acceleration of existing erosion in isolated areas, they would not be sufficient to result in substantial increases in the mobilization and/or deposition of sediment (Phillip Williams & Associates 2006). Therefore, although an environmental effect would occur, it is not considered sufficient to exceed significance criteria and result in a significant adverse effect.

### Geomorphic Processes along the Project Levees

The impact mechanism and analysis methodology for this impact is the same as described above for “Geomorphic Processes along the River Channels.” However, the analysis below addresses the effects of changes in shear stresses and erosive potential on the levee system rather than the river channels, shorelines, and floodways. Shear stress index values along the levee system are provided in Table 3.3-4.



**Table 3.3-4  
Levee Surface Shear Stress Indexes**

| Reach Location                                      | Shear Stress Index Value |                                                                                      |                                              |
|-----------------------------------------------------|--------------------------|--------------------------------------------------------------------------------------|----------------------------------------------|
|                                                     | Existing Condition       | Applicant Preferred<br>Alternative – Above Star<br>Bend Setback Levee<br>Alternative | Intermediate<br>Setback Levee<br>Alternative |
| Yuba River through Marysville                       | 0.04                     | 0.05                                                                                 | 0.04                                         |
| Feather River through Yuba City                     | 0.10                     | 0.10                                                                                 | 0.10                                         |
| Feather River right bank at Shanghai Bend           | 0.07                     | 0.07                                                                                 | 0.07                                         |
| Feather River left bank downstream of Shanghai Bend | 0.19                     | 0.20                                                                                 | 0.19                                         |
| Feather River knickzone                             | 0.05                     | 0.05                                                                                 | 0.06                                         |
| Feather River levee setback reach                   | 0.20                     | 0.20                                                                                 | 0.19                                         |
| Feather River right bank at Star Bend               | 0.14                     | 0.12                                                                                 | 0.12                                         |
| Feather River downstream of Star Bend               | 0.14                     | 0.14                                                                                 | 0.14                                         |
| Source: Phillip Williams & Associates 2006          |                          |                                                                                      |                                              |

The shear stress index analysis for the levee system shows that along the Feather River right bank at Star Bend, the Applicant Preferred Alternative – ASB Setback Levee Alternative would reduce the shear stress index along the levees by 14% (approximating to a 14% reduction in erosive potential). Along the Feather River left bank downstream of Shanghai Bend, there is a 5% increase in the shear stress index along the levees. In the reaches through Yuba City and Marysville, the maximum increase in the shear stress index along the levees is 25%. However, this relatively large percentage increase is due to the existing shear stress index being very low, 0.04. Implementation of the Applicant Preferred Alternative increases the shear stress index value by only 0.01 to 0.05.

Based on these results, various areas along the Feather and Yuba Rivers levees would experience small increases in shear stresses, and therefore erosive potential, resulting from the implementation of the Applicant Preferred Alternative. However, even with these increases, the types of materials typically used to construct and protect levees (e.g., compacted soils, vegetative cover, riprap) would adequately resist the overall erosive potential. Even if minor erosion did occur, the issue would be identified and addressed by applicable Reclamation Districts as part of their regular inspection and maintenance programs. Estimated increases in shear stresses would not be sufficient to result in substantial increases in the mobilization and/or deposition of sediment or result in increased exposure of persons or private property to flood hazards (i.e., through damage to the levees) (Phillip William & Associates 2006). Therefore, although an environmental effect would occur, it is not considered sufficient to exceed significance criteria and result in a significant adverse effect.

### **AP Impact 3.3-b: Substantially Affect Groundwater Resources or Substantially Reduce Water Supply**

#### ***Groundwater Levels***

Construction of the Applicant Preferred Alternative – ASB Setback Levee Alternative would include installation of slurry cutoff walls in various portions of the setback levee alignment to control underseepage during flood events. The purpose of a slurry cutoff wall is to dissipate the hydraulic gradient in the levee foundation and reduce seepage quantities. This would reduce the hydraulic gradient and seepage flows through the foundation soils adjacent to the cutoff wall to safe levels. To achieve maximum effectiveness, the cutoff wall must extend completely through underlying permeable strata and terminate some distance into an underlying, reasonably

continuous, less permeable layer. The presence of slurry cutoff walls could restrict the movement of groundwater in either direction. Potential consequences are increases or decreases in the water levels in shallower wells and/or localized near-surface groundwater levels in areas immediately east and west of the slurry cutoff wall.

Groundwater levels in the area south of the Yuba River and east of the Feather River have generally risen since completion of the South Yuba Canal and delivery of irrigation water beginning in 1982. Water levels in the RD 784 area have been relatively stable since the mid-1990s on the order of 30 feet above sea level (Bookman-Edmonston Engineering 2000). This is above the elevation of water in the Feather River during nonflood periods. Water could move from the Feather and Yuba Rivers to nearby wells during periods of well pumping when the drawdown is below the level of water in the rivers. Although slurry cutoff walls could interfere with this movement, any effect on total water supply would not be substantial. A representative of RD 784 has indicated that there have been no complaints about reductions in well yield in association with the Corp's installation in 1997 of a 3-mile-long, 70-foot-deep slurry cutoff wall for seepage control along the Feather River levee from approximately Broadway to Star Bend, in what is now FRLRP Segment 2 (Goff, pers. comm., 2003).

The nearly uniform groundwater levels in RD 784 indicate that recharge from the east is nearly in balance with groundwater pumping and any losses to the Feather and Yuba Rivers. Water levels could rise on the east side of the setback levee where slurry cutoff walls are constructed if the pumping does not equal or exceed the recharge. Water could continue to move in either direction in the areas where slurry cutoff walls would not be constructed. Even with supplemental subsurface data, it would be difficult to determine where, and to what extent, groundwater levels could change as a result of the presence of slurry cutoff walls. It can be expected, however, that any changes would be gradual. If local groundwater were to rise periodically to levels at which trees, crops, or structures could be damaged, excess groundwater could be pumped out using selected wells (as under current practices) or newly installed drains. TRLIA would coordinate with landowners as needed to resolve such circumstances. The excess groundwater could be delivered to irrigated lands or discharged to drains and then to the Feather River as part of RD 784's operations and maintenance. Potential changes in groundwater levels associated with the installation of slurry cutoff walls would not substantially affect water supply or local drainage.

### ***Water Demand and Available Water Supply***

The footprint of the setback levee under the Applicant Preferred Alternative – ASB Setback Levee Alternative and related facilities (e.g., access corridors, relocation of Pump Station No. 3, permanent conservation easements on habitat mitigation areas) would remove approximately 290 acres of Important Farmland in FRLRP Segment 2 from agricultural use. As described above in Section 3.1, "Land Use and Agriculture," it is assumed that up to approximately 525 acres of Important Farmland in the setback area would be converted to habitat and removed from agricultural production. Any irrigation associated with the establishment or maintenance of the setback levee or riparian, wetland, or other habitats would not surpass the current water use for agricultural crops and orchards. Any habitat restoration areas would be required to be self-sustaining, in that they would not need irrigation other than during the initial establishment of new vegetation.

It is expected that demand for water supply would not increase as a direct result of implementation of the Applicant Preferred Alternative; in fact, demand is anticipated to decrease because up to approximately 800 acres of Important Farmland would be removed from irrigated agricultural use. Project effects on water demand and available water supply would be beneficial.

### **AP Impact 3.3-c: Substantially Alter the Existing Drainage Pattern of the Site or Area**

On the lands outside the proposed levee setback area, between the setback levee alignment under the Applicant Preferred Alternative – ASB Setback Levee Alternative and the WPIC about 2 miles to the east, most of the surface runoff, including irrigation runoff, is collected in a series of RD 784 sloughs and canals that eventually drain to the Plumas Lake Canal. In addition, a small area east of the proposed levee setback area drains to Lateral 7/8. The setback levee alignment under the Applicant Preferred Alternative crosses Lateral 7/8 and the

Plumas Lake Canal as they continue west into the levee setback area. The water conveyed into the levee setback area through Lateral 7/8 empties into Lateral 6, which drains a portion of the proposed levee setback area. The water conveyed in Lateral 6 and the Plumas Lake Canal is pumped into the Feather River floodway at RD 784 Pump Station No. 3.

To ensure continued functioning of the drainage system east of the levee setback area, Pump Station 3 is proposed to be relocated to the land side of the setback levee to drain the Plumas Lake Canal to the west of the levee. The buried culvert from Lateral 7/8 that joins Lateral 6 above Star Bend would need to be removed where it crosses the setback levee alignment. Flows from Lateral 7/8 would be redirected to either the new Pump Station No. 3 or another existing pump station operated by RD 784. All drainage from Lateral 7/8 would continue to the Feather River with no loss in system conveyance capacity.

The Applicant Preferred Alternative would include the excavation of borrow sites that could also alter site drainage. Soil removed from the existing levee would be used to fill and regrade borrow areas to original contours. If sufficient soil is not available to completely fill borrow sites within the setback area, or regrading is needed to ensure proper drainage of flood waters and avoidance of fish stranding, borrow areas would be graded to slopes of 3:1 (horizontal:vertical) or flatter and would drain away from the setback levee and toward the river or toward existing drainage ways.

Therefore, although the Applicant Preferred Alternative may alter the path of drainage flows in some areas, it would not alter the performance or capacity of the drainage system. The proposed action would not have an adverse effect on local drainage.

#### **3.3.2.4 INTERMEDIATE SETBACK LEVEE ALTERNATIVE**

Under the Intermediate Setback Levee Alternative environmental effects related to surface and groundwater hydrology and geomorphology would generally be the same, or very similar to those described for the Applicant Preferred Alternative – ASB Setback Levee Alternative. Environmental effects for each topic area discussed for the Applicant Preferred Alternative are described below for the Intermediate Setback Levee Alternative.

#### **ISL Impact 3.3-a: Alter Regional or Local Hydrology, Result in Erosion of the Levee System, or Substantially Increase the Mobilization and/or Deposition of Sediments**

##### ***Flood Hydrology***

##### **Local and Upstream Effects**

Mechanisms by which the Intermediate Setback Levee Alternative would affect local and upstream flood stage elevations would be the same as described above for the Applicant Preferred Alternative – ASB Setback Levee Alternative. However, effects would be less for the Intermediate Setback Levee Alternative due to the smaller size of the setback area. Hydraulic simulations indicate that for the 1-in-100 and 1-in-200 AEP events, the Intermediate Setback Levee would lower the water level at the confluence of the Feather and Yuba Rivers by 1.0 feet and 1.2 feet, respectively (MBK Engineers 2006b). Lowering flood stages and replacing the existing levee with a well-designed, well-constructed levee built using up-to-date construction standards would reduce the potential for levee failures in this channel segment that has historically been plagued by levee instability and failures. Effects of the Intermediate Setback Levee on local flood protection would be beneficial, although less so than under the Applicant Preferred Alternative because reductions in flood stage elevations would be less.

##### **Downstream Effects**

Mechanisms by which the Intermediate Setback Levee Alternative would affect downstream flood stage elevations would be the same as described above for the Applicant Preferred Alternative – ASB Setback Levee Alternative. However, effects would be slightly less for the Intermediate Setback Levee Alternative due to the

smaller size of the setback area. The hydraulic simulations indicate that the Feather River peak flow just downstream of the Intermediate Setback Levee under a 1-in-100 AEP event would increase from 271,938 cfs to 272,262 cfs, an increase of less than 1% (MBK Engineers 2006b). The slight increase in flows would increase water surface elevation by 0.02 foot in the Feather River from the southern end of the setback levee alignment to the confluence with the Bear River. There would be no measurable increase in flood stage elevations downstream of the Bear River. For the 1-in-200 AEP event, the flows would increase from 347,031 cfs to 348,624 cfs, an increase of less than 1%. The water surface elevation in the Feather River from the southern end of the setback levee alignment to the confluence with the Bear River would increase by 0.07 foot as a result of the increased flow. Again, there would be no measurable increase in flood stage elevations downstream of the Bear River. The stage for the design flow remains below the project design stage (1957 profile) for the entire Feather River reach below the setback levee.

The simulated increases in downstream floodwater flows with the Intermediate Setback Levee are small (less than 1%), the increases in downstream flood stage elevation would be less than 1 inch for the 1-in-100 and 1-in-200 AEP events, and the stage for the design flow would remain below the project design stage even with these minor increases. Implementation of the F-CO would further reduce these minor increases. These changes are not considered sufficient to result in increased exposure of persons or private property to flood hazards. Therefore, no significant adverse environmental effect would occur.

## ***Geomorphic Processes***

### **Geomorphic Processes along the River Channels**

Effects on geomorphic process in local river channels, shorelines, and floodways under the Intermediate Setback Levee Alternative would be similar to those described above for the Applicant Preferred Alternative – ASB Setback Levee Alternative. The impact mechanism and analysis methodology are the same for the two alternatives. As shown in Table 3.3-3, changes in the shear stress index under the Intermediate Setback Levee Alternative would be the same as under the Applicant Preferred Alternative, with the exception of the Feather River right bank at Shanghai Bend reach where an increase in the index would be slightly less for the Intermediate Setback Levee Alternative. Therefore, as described for the Applicant Preferred Alternative, although an environmental effect related to geomorphic process along the river channels would occur, it is not considered sufficient to exceed significance criteria, therefore it would not result in a significant adverse effect.

### **Geomorphic Processes along the Project Levees**

Changes in geomorphic processes affecting waterside levee surfaces under the Intermediate Setback Levee Alternative would be similar to those described above for the Applicant Preferred Alternative – ASB Setback Levee Alternative. The impact mechanism and analysis methodology are the same for the two alternatives. As shown in Table 3.3-4, changes in the shear stress index under the Intermediate Setback Levee Alternative would be the same as under the Applicant Preferred Alternative for four of the eight reaches in the study area. For three reaches; Yuba River at Marysville, Feather River left bank downstream of Shanghai Bend, and Feather River levee setback reach; increases in the index would be slightly less for the Intermediate Setback Levee Alternative. In these instances, shear stress indexes would either match, or be less than the existing condition. For one reach, Feather River knickzone, the shear stress index under the Intermediate Setback Levee Alternative would be 20% greater than the Applicant Preferred Alternative and the existing condition. However, this relatively large percentage increase is due to the existing shear stress index being very low, 0.05. Implementation of the Intermediate Setback Levee Alternative increases the shear stress index value by only 0.01 to 0.06. Therefore, as described for the Applicant Preferred Alternative, although an environmental effect related to geomorphic process along the project levees would occur, it is not considered sufficient to exceed significance criteria, therefore it would not result in a significant adverse effect.

### **ISL Impact 3.3-b: Substantially Affect Groundwater Resources or Substantially Reduce Water Supply**

#### ***Groundwater Levels***

Impacts on groundwater levels under the Intermediate Setback Levee Alternative would be the same as described above for the Applicant Preferred Alternative – ASB Setback Levee Alternative. Potential changes in groundwater levels associated with the installation of slurry cutoff walls as part of setback levee construction would not substantially affect water supply or local drainage.

#### ***Water Demand and Available Water Supply***

Mechanisms by which the Intermediate Setback Levee Alternative would affect water demand and available water supply would be the same as described above for the Applicant Preferred Alternative – ASB Setback Levee Alternative. However, effects would be slightly less for the Intermediate Setback Levee Alternative due to the smaller size of the setback area. The footprint of the Intermediate Setback Levee and related facilities would remove approximately 270 acres of Important Farmland in FRLRP Segment 2 from agricultural use. As described above in Section 3.1, “Land Use and Agriculture,” it is assumed that up to approximately 360 acres of Important Farmland in the setback area would be converted to habitat and removed from agricultural production. Any irrigation associated with the establishment or maintenance of the setback levee or riparian, wetland, or other habitats would not surpass the current water use for agricultural crops and orchards. Any habitat restoration areas would be irrigated while the plantings become established, but would be self-sustaining thereafter.

It is expected that demand for water supply would not increase as a result of implementation of the Intermediate Setback Levee Alternative; in fact, demand is anticipated to decrease because up to approximately 600 acres of Important Farmland would be removed from irrigated agricultural use. Project effects on water demand and available water supply would be beneficial.

### **ISL Impact 3.3-c: Substantially Alter the Existing Drainage Pattern of the Site or Area**

Impacts on local drainage under the Intermediate Setback Levee Alternative would be the same as described above for the Applicant Preferred Alternative – ASB Setback Levee Alternative. All drainage from local canals and channels would continue to the Feather River with no loss in system conveyance capacity. The design and reclamation of borrow areas would ensure these sites do not have adverse effects on local drainages.

#### **3.3.2.5 LEVEE STRENGTHENING ALTERNATIVE**

### **LS Impacts 3.3-a/c: a) Alter Regional or Local Hydrology, Result in Erosion of the Levee System, or Substantially Increase the Mobilization and/or Deposition of Sediments; c) Substantially Alter the Existing Drainage Pattern of the Site or Area**

The Levee Strengthening Alternative would not include a setback levee and associated floodway expansion, but rather would result in a continuation of the existing levee configuration in the project area. As discussed below, installation of slurry cutoff walls could affect local groundwater conditions; however, this alternative would not result in any long-term changes to the existing drainage pattern of the project site, would not affect the rate or amount of surface runoff in the project area, would not increase exposure of persons or private property to flood hazards, would not reduce water supply or alter regional or local hydrology, and would not alter geomorphic processes in the Feather River. Therefore, these impact mechanisms would not occur under the Levee Strengthening Alternative and are not discussed further.

### **LS Impact 3.3-b: Substantially Affect Groundwater Resources or Substantially Reduce Water Supply**

Repairs to the left bank levee of the Feather River would include installation of slurry cutoff walls in various portions of the levees to control seepage during flood stages. The purpose of a slurry cutoff wall is to dissipate the hydraulic gradient in the levee foundation and reduce seepage quantities. This would reduce the hydraulic gradient and seepage flows through the foundation soils adjacent to the cutoff wall to safe levels. To achieve maximum effectiveness, the cutoff wall must extend completely through the permeable strata and terminate some distance into an underlying, reasonably continuous, less permeable layer. Under the Levee Strengthening Alternative slurry cutoff walls may extend to depths of 80 feet or more. The presence of slurry cutoff walls could restrict the movement of groundwater in either direction (away from the Feather River channel or toward the channel). Potential consequences are increases or decreases in the water levels in shallower wells and/or localized near-surface groundwater levels in areas immediately east and west of the slurry cutoff wall.

Groundwater levels in the area south of the Yuba River and east of the Feather River have generally risen since completion of the South Yuba Canal and delivery of irrigation water beginning in 1982. Water levels in the RD 784 area have been relatively stable since the mid-1990s, on the order of 30 feet above sea level (Bookman-Edmonston Engineering 2000). This is above the elevation of water in the Feather River during nonflood periods. Water could move from the Feather River to nearby wells during periods of well pumping when the drawdown is below the level of water in the river. Although slurry cutoff walls could interfere with this movement, any effect on total water supply would not be substantial. A representative of RD 784 has indicated that there have been no complaints about reductions in well yield in association with the Corps's 1997 installation in 1997 of a 3-mile-long, 70-foot-deep slurry cutoff wall for seepage control along the Feather River levee from approximately Broadway to Star Bend, in what is now FRLRP Segment 2 (Goff, pers. comm., 2003).

The nearly uniform groundwater levels in RD 784 indicate that recharge from the east is nearly in balance with groundwater pumping and any losses to the Feather River. Water levels could rise on the east side of the existing levee where slurry cutoff walls are constructed if the pumping does not equal or exceed the recharge. Water could continue to move in either direction in the areas where slurry cutoff walls would not be constructed. Even with supplemental subsurface data to be obtained during design, it would be difficult to determine where, and to what extent, groundwater levels could change as a result of the presence of slurry cutoff walls. It can be expected, however, that any changes would be gradual. If local groundwater were to rise periodically to levels at which trees, crops, or structures could be damaged, excess groundwater could be pumped out using selected wells (as under current practices) or newly installed drains. TRLIA would coordinate with landowners as needed to resolve such circumstances. The excess groundwater could be delivered to irrigated lands or discharged to drains and then to the Feather River as part of RD 784's operations and maintenance.

Potential changes in groundwater levels associated with the installation of slurry cutoff walls are not expected to substantially affect water supply or local drainage.

#### **3.3.2.6 NO-ACTION ALTERNATIVE**

If no permissions were granted to alter the existing levee or discharge dredged or fill material into waters of the United States, no changes to existing hydrologic conditions or geomorphic processes would occur. Under these conditions, heavy underseepage and loss of foundation soils would be expected to continue and the threat of another levee failure in the Segment 2 project area would remain. Under the No-Action Alternative, it is possible that localized levee repairs (e.g., correction of identified waterside erosion sites) could be authorized under the federal Clean Water Act (CWA) Nationwide Permit (NWP) #3. This work would have to be small in scale and would be unlikely to affect the local drainage system. No changes to groundwater hydrology and geomorphology would occur.

If no action was taken to completely repair this deficient levee segment, the potential for a catastrophic loss of lives and property associated with a levee failure in the RD 784 area would remain high, as described previously. Because no significant improvements to the Segment 2 levee would be undertaken, flood stages upstream of the project area would be the same as or similar to current conditions.

### **3.3.3 MITIGATION**

No significant impacts related to surface and groundwater hydrology and geomorphology are identified and no mitigation measures are required.



## 3.4 WATER QUALITY

This section addresses the water quality of the Feather River and groundwater quality in the project area and the potential direct effects of the Applicant Preferred Alternative – Above Star Bend (ASB) Setback Levee Alternative (also referred to as the “Applicant Preferred Alternative”) and other alternatives on water quality. Impact mechanisms addressed in this section are erosion or discharge of sediments and other pollutants into waterways during project construction and the potential for ongoing agricultural operations in the expanded floodway under the Applicant Preferred Alternative and Intermediate Setback Levee Alternative to result in agricultural contaminants (e.g., fertilizers, pesticides) adversely affecting Feather River water quality. Section 3.5, “Hazardous Materials,” discusses the known and potential environmental hazards in the project area (including existing contaminants that may be on agricultural lands), the status of hazardous materials testing, and the potential direct effects on water quality that could result from the release of hazardous materials that are currently present in the project area into the environment.

Indirect effects of the Applicant Preferred Alternative and other alternatives are addressed in Chapter 4.0, “Cumulative and Growth-Inducing Effects.” For example, for an evaluation of effects on water quality related to increased water demand from development potentially facilitated by the Applicant Preferred Alternative and other action alternatives, see Section 4.1.2.5, “Hydrology, Water Supply and Quality, and Drainage.” A discussion of the potential for the action alternatives to result in increased sedimentation of area waterways when combined with other past, present, and future flood control projects in the region is included in Section 4.2.4.3, “Water Resources and River Geomorphology.”

### 3.4.1 EXISTING CONDITIONS

#### 3.4.1.1 SURFACE WATER QUALITY

Under Section 303(d) of the federal Clean Water Act (CWA), states are required to develop lists of surface water bodies that are not attaining water quality objectives (i.e., found to be polluted). Section 303(d) requires that the state develop a total maximum daily load (TMDL) for each of the listed pollutants causing the impairment. The TMDL is the amount of loading that the water body can receive and still be in compliance with water quality objectives. In California, TMDLs are adopted by the respective regional water quality control boards, approved by the State Water Resources Control Board, and transmitted to the U.S. Environmental Protection Agency (EPA) for approval. The EPA must either approve a TMDL prepared by the state or, if it disapproves the state’s TMDL, issue its own. The list is known as the 303(d) list of impaired waters (303[d] list). The Feather River is included on the 303(d) list of impaired waters for diazinon, Group A pesticides, mercury, and unknown toxicity. Agriculture and urban runoff are the main sources for diazinon and Group A pesticides, resource extraction is the main source for mercury, and the source is unknown for unknown toxicity. The Central Valley Regional Water Quality Control Board (RWQCB) has TMDL priorities of high, low, medium, and low for the respective stressors (State Water Resources Control Board 2002).

Table 3.4-1, “Summary of Conventional Water Quality Constituents in the Feather River,” shows a summary of average concentrations from monthly water samples for conventional physical and inorganic chemical constituents measured in the Feather River at Nicolaus from February 1996 through April 1998 (U.S. Geological Survey 2000). Water quality objectives identified in Table 3.4-1 consist of applicable regulatory standards, with the source for each regulatory standard provided in the table footnotes. In general, the data indicate that the Feather River is low in total dissolved solids (TDS) as indicated by measurements of electrical conductivity, total hardness, and specific cations and anions. The water has neutral pH, moderate alkalinity, and adequate dissolved oxygen levels for aquatic organisms. The water from the Feather River is also generally low in nutrients (nitrogen and phosphorus) that can cause growth of nuisance algae and aquatic vascular plants. Trace metal content is also low. Although mercury is routinely detected in the Feather River, the concentrations have not exceeded ambient California Toxics Rule criteria. California Toxics Rule criteria consist of numeric water quality criteria promulgated by EPA for priority toxic pollutants and other provisions for water quality standards to be applied to

| <b>Table 3.4-1</b><br><b>Summary of Conventional Water Quality Constituents in the Feather River</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                        |                           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|---------------------------|
| Constituent                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Water Quality Objective                | Feather River at Nicolaus |
| Temperature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <2.5°F <sup>a</sup>                    | 59.4°F                    |
| Flow (cfs)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                        | 359                       |
| Electrical Conductivity (µS/cm)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                        | 84                        |
| DO (mg/L)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 7.0 <sup>b</sup>                       | 10.5                      |
| DO Saturation (%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 85 <sup>b</sup>                        | 104                       |
| pH (standard units)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 6.5 to 8.5 <sup>c</sup>                | 7.7                       |
| Alkalinity (mg/L CaCO <sub>3</sub> )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                        | 34.2                      |
| Total Hardness (mg/L CaCO <sub>3</sub> )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                        | 34.8                      |
| Suspended Sediment (mg/L)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | narrative <sup>d</sup>                 | 36.5                      |
| Calcium (mg/L)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                        | 8.2                       |
| Magnesium (mg/L)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                        | 3.5                       |
| Sodium (mg/L)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                        | 3.3                       |
| Potassium (mg/L)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                        | 0.9                       |
| Chloride (mg/L)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 500 <sup>e</sup>                       | 1.9                       |
| Sulfate (mg/L)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 500 <sup>e</sup>                       | 3.2                       |
| Silica (mg/L)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                        | 12.8                      |
| NO <sub>2</sub> +NO <sub>3</sub> (mg/L N)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | NO <sub>3</sub> <10 <sup>f</sup>       | 0.17                      |
| Total Phosphorus (mg/L)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                        | 0.03                      |
| Arsenic (µg/L)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 50 <sup>g</sup>                        | 1.0                       |
| Chromium (µg/L)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 180 <sup>g</sup>                       | <MRL                      |
| Copper (µg/L)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 5.1 <sup>g</sup>                       | 1.3                       |
| Mercury (µg/L)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0.050 <sup>h</sup>                     | 0.0085                    |
| Nickel (µg/L)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 52 <sup>g</sup>                        | 1.0                       |
| Zinc (µg/L)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 120 <sup>g</sup>                       | 1.6                       |
| Molinate (ng/L)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 13,000 <sup>i</sup>                    | 373                       |
| Simazine (ng/L)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 3,400 <sup>j</sup>                     | 88.9                      |
| Carbofuran (ng/L)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 40,000 <sup>e</sup> , 500 <sup>i</sup> | 38.5                      |
| Diazinon (ng/L)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 51 <sup>k</sup>                        | 98                        |
| Carbaryl (ng/L)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 700 <sup>j</sup>                       | 142                       |
| Thiobencarb (ng/L)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1,000 <sup>a</sup>                     | 167                       |
| Chlorpyrifos (ng/L)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 14 <sup>k</sup>                        | <25                       |
| Methidathion (ng/L)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                        | 57                        |
| Notes: CaCO <sub>3</sub> = calcium carbonate; DO = dissolved oxygen; µg/L = micrograms per liter; µS/cm = microsiemens per centimeter; mg/L = milligrams per liter; MRL = method reporting limit; ng/L = nanograms per liter; NO <sub>2</sub> = nitrogen dioxide; NO <sub>3</sub> = nitrogen trioxide<br><sup>a</sup> RWQCB Basin Plan water quality objective for allowable change from controllable factors<br><sup>b</sup> RWQCB Basin Plan water quality objective<br><sup>c</sup> RWQCB Basin Plan water quality objective; <0.5 allowable change from controllable factors<br><sup>d</sup> RWQCB Basin Plan narrative objective: water shall not contain constituent in concentrations that would cause nuisance or adversely affect beneficial uses<br><sup>e</sup> Secondary drinking water maximum contaminant level (MCL)<br><sup>f</sup> Primary drinking water maximum contaminant level (MCL)<br><sup>g</sup> California Toxics Rule aquatic life criteria for 4-day average dissolved concentration<br><sup>h</sup> California Toxics Rule human health maximum criteria total recoverable concentration<br><sup>i</sup> California DFG hazard assessment value<br><sup>j</sup> U.S. EPA Integrated Risk Information System reference dose for drinking water quality<br><sup>k</sup> California DFG aquatic life guidance value for 4-day average concentration<br>Source: Constituent measurements from U.S. Geological Survey 2000 |                                        |                           |

waters in the State of California. Pesticides have been detected in the Feather River, although, with the exception of the drinking-water standard for carbofuran, there are no applicable regulatory criteria established for the pesticides that have been detected. DFG has established guidance values for aquatic-life chronic (i.e., 4-day average) criteria applicable to the organophosphate pesticides diazinon and chlorpyrifos. The average concentration of diazinon in the Feather River exceeds the DFG guidance level of 50 nanograms per liter (California Department of Fish and Game 2000). Pesticide levels in the Feather River are presumably related to the influence of the extensive agricultural and urban activities (Oroville, Marysville, and Yuba City) occurring in the surrounding watershed.

Water quality in the Feather River has also been evaluated since 1998 as part of DWR's Sacramento River Watershed Program (Larry Walker Associates 2001). Water quality data have generally supported the earlier findings of the USGS National Water Quality Assessment (NAWQA) program data. In addition, toxicity data from the DWR program have indicated that Feather River water has occasionally been toxic to test organisms. Bulk sediment toxicity has been identified in one of four samples collected in the Feather River at Nicolaus since 1998. No toxicity has been detected from sediment toxicity tests conducted on Yuba River sediments.

Table 3.4-2, "Concentrations of Trace Metals Detected in Feather River Sediment," shows NAWQA sediment concentrations of trace metals from a basin-wide assessment of streambed sediments within the Sacramento River Basin conducted in 1997. This is the most recent sediment trace metal data available for the project area. This assessment included sediment samples from three areas within the project region, the Yuba River near Marysville, on the Feather River near Nicolaus (approximately 20 miles south of the project site), and on the Bear River at Highway 70 (see Figure 1-2). The results indicate that concentrations of trace metals in river sediments in the project region are generally low relative to San Francisco Bay RWQCB criteria for reuse in wetlands. These criteria are often used outside the San Francisco Bay area as an indicator of the potential for sediments to cause or not cause water quality concerns. The concentrations of chromium and nickel in the Feather River, copper in the Yuba River, and mercury in the Bear River were slightly higher than the RWQCB criteria for wetland cover use. Concentrations of arsenic, chromium, copper, mercury, and zinc exceeded the most recent guidance criteria for general toxic effect thresholds (MacDonald and Berger 2000).

| <b>Table 3.4-2<br/>Concentrations of Trace Metals Detected in Feather River Sediment</b>                                                                                                                                                                                                                                         |                         |                            |                         |                                                                            |                                               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|----------------------------|-------------------------|----------------------------------------------------------------------------|-----------------------------------------------|
| Constituent                                                                                                                                                                                                                                                                                                                      | Yuba River <sup>a</sup> | Feather River <sup>a</sup> | Bear River <sup>a</sup> | Sediment Criteria for Wetlands Creation and Levee Restoration <sup>b</sup> |                                               |
|                                                                                                                                                                                                                                                                                                                                  |                         |                            |                         | Wetlands Creation Noncover                                                 | Wetlands Creation Cover and Levee Restoration |
| Arsenic (mg/kg)                                                                                                                                                                                                                                                                                                                  | 21                      | 11                         | 12                      | 33–85                                                                      | <33                                           |
| Barium (mg/kg)                                                                                                                                                                                                                                                                                                                   | 600                     | 510                        | 420                     |                                                                            |                                               |
| Cadmium (mg/kg)                                                                                                                                                                                                                                                                                                                  | 0.4                     | 0.3                        | 0.7                     | 5–9                                                                        | <5                                            |
| Chromium (mg/kg)                                                                                                                                                                                                                                                                                                                 | 210                     | 280                        | 220                     | 220–300                                                                    | <220                                          |
| Copper (mg/kg)                                                                                                                                                                                                                                                                                                                   | 95                      | 70                         | 69                      | 90–390                                                                     | <90                                           |
| Lead (mg/kg)                                                                                                                                                                                                                                                                                                                     | 18                      | 19                         | 18                      | 50–110                                                                     | <50                                           |
| Mercury (mg/kg)                                                                                                                                                                                                                                                                                                                  | 0.29                    | 0.19                       | 0.4                     | 0.35–1.3                                                                   | <0.35                                         |
| Nickel (mg/kg)                                                                                                                                                                                                                                                                                                                   | 98                      | 160                        | 85                      | 140–200                                                                    | <140                                          |
| Selenium (mg/kg)                                                                                                                                                                                                                                                                                                                 | 0.6                     | 0.3                        | 0.3                     | 0.7–1.4                                                                    | <0.7                                          |
| Silver (mg/kg)                                                                                                                                                                                                                                                                                                                   | 0.2                     | 0.2                        | 0.3                     | 1.0–2.2                                                                    | <1.0                                          |
| Zinc (mg/kg)                                                                                                                                                                                                                                                                                                                     | 98                      | 110                        | 110                     | 160–270                                                                    | <160                                          |
| Note: mg/kg = milligrams per kilogram                                                                                                                                                                                                                                                                                            |                         |                            |                         |                                                                            |                                               |
| <sup>a</sup> Source: U.S. Geological Survey 2000                                                                                                                                                                                                                                                                                 |                         |                            |                         |                                                                            |                                               |
| <sup>b</sup> Source: San Francisco Bay RWQCB disposal option sediment screening criteria. Criteria specify the allowable use based on two categories: use for wetland noncover where exposure to the aquatic environment would be limited and wetland cover or levee construction where sediments would be exposed to the water. |                         |                            |                         |                                                                            |                                               |

### **3.4.1.2 GROUNDWATER QUALITY**

Groundwater provides most water supplies for the Marysville, Linda, and Olivehurst areas and for rural properties in the project vicinity. In general, the mineral content of the groundwater underlying south Yuba County is suitable for domestic and agricultural uses. The City of Olivehurst has 10 wells and Linda has five wells that draw water from 300–600 feet below ground surface (Foothill Associates 1999). Water quality samples routinely collected from these wells indicate that all regulated inorganic and organic pollutants are below the applicable drinking-water standards. However, groundwater in the area contains relatively high levels of iron, manganese, and gases (i.e., methane and hydrogen sulfide), which occasionally cause taste and odor problems but are not a threat to human health.

## **3.4.2 ENVIRONMENTAL CONSEQUENCES**

### **3.4.2.1 SIGNIFICANCE CRITERIA**

A project alternative would have a significant impact on water quality if its construction or operation would:

- ▶ violate any water quality standards or waste discharge requirements or otherwise substantially degrade water quality; or
- ▶ alter regional or local hydrology, resulting in erosion of the levee system or substantial increases in the mobilization and/or deposition of sediments.

The following analysis addresses direct effects of the Applicant Preferred Alternative – ASB Setback Levee Alternative and other alternatives. Potential indirect effects of the Applicant Preferred Alternative and other alternatives are addressed in Chapter 4.0, “Cumulative and Growth-Inducing Effects.” For example, for an evaluation of effects on water quality related to increased water demand from development potentially facilitated by the Applicant Preferred Alternative and other action alternatives, see Section 4.1.2.5, “Hydrology, Water Supply and Quality, and Drainage.” A discussion of the potential for the action alternatives to result in increased sedimentation of area waterways when combined with other past, present, and future flood control projects in the region is included in Section 4.2.4.3, “Water Resources and River Geomorphology.”

### **3.4.2.2 APPLICANT PREFERRED ALTERNATIVE – ASB SETBACK LEVEE ALTERNATIVE**

#### **AP Impact 3.4-a: Violate Any Water Quality Standards or Waste Discharge Requirements or Otherwise Substantially Degrade Water Quality during Project Construction**

Among the construction activities associated with the proposed setback levee are the following:

- ▶ excavating borrow material from proposed borrow sites,
- ▶ constructing the new setback levee,
- ▶ relocating Pump Station No. 3,
- ▶ removing all or nearly all of the existing levee in project Segment 2, and
- ▶ relocating or modifying other existing facilities (e.g., wells, drainage channels, utility infrastructure, and irrigation systems).

None of these activities are expected to adversely affect groundwater quality. Potential effects on groundwater supply are evaluated in Section 3.3, “Surface and Groundwater Hydrology and Geomorphology.” Construction

activities would disturb existing vegetation cover and soils, would expose large areas of disturbed ground (approximately 360 acres during the construction period) that could be subject to rainfall and erosion, and could cause temporary discharges of sediment and other contaminants in stormwater runoff to drainage channels and the Feather River. Petroleum products or other construction-related substances (e.g., concrete, hydraulic fluids, solvents) also could be discharged inadvertently to waterways via stormwater runoff.

There is the potential for the quantity and intensity of this impact to be large because of the areal extent of the construction activities. However, large-scale erosion and generation of contaminated runoff are unlikely because most land disturbance would occur during the dry months from late spring through fall. It is assumed that active construction work would be reduced or would not occur during the winter months. In addition, temporary erosion control measures would be implemented during construction to minimize stormwater pollution resulting from erosion and sediment migration from the construction areas, borrow areas, laydown/staging areas, and disposal areas. These temporary measures may include:

- ▶ use of construction staging to minimize the amount of area disturbed at any one time;
- ▶ secondary containment for storage of fuel and oil; and
- ▶ the management of stockpiles and disturbed areas using earth berms, diversion ditches, straw wattles, straw bales, silt fences, gravel filters, mulching, revegetation, and temporary covers as appropriate.

Nevertheless, some soil erosion and sedimentation of waterways or discharge of contaminated runoff to waterways could occur, potentially resulting in significant adverse water quality effects, including potential temporary exceedances of water quality standards such as those identified above in Table 3.4-1.

#### **AP Impact 3.4-b: Violate Any Water Quality Standards or Waste Discharge Requirements or Otherwise Substantially Degrade Water Quality during Project Operation**

After the completion of project construction, there are two mechanisms for operation of the Applicant Preferred Alternative – ASB Setback Levee Alternative to release new contaminants (i.e., contaminants not already present on the project site) that could enter the Feather River; operation of the new Pump Station No. 3 and continuing agricultural operations on the water side of the new setback levee in the setback area. Operation of the new Pump Station No. 3 would involve the use of lubricants, cleaning fluids, and other hazardous materials. However, pump station operations would be contained within the pump station building and would follow all applicable laws and regulations regarding the transport, use, and disposal of hazardous materials. Operation of the new Pump Station No. 3 would not result in any significant adverse water quality effects.

As described in Chapter 2.0, “Alternatives,” after construction of the Applicant Preferred Alternative, it is assumed that approximately 525 acres of existing agricultural land would be retained in active production in the setback area and approximately 525 acres would be taken out of production (e.g., soil borrow areas not replanted as orchard). These lands primarily consist of fruit and nut orchards. Standard agricultural operations on these lands include applications of pesticides, herbicides, and fertilizers. Under existing conditions, it is expected that stormwater and irrigation runoff carry a certain amount of these pesticides, herbicides, and fertilizers and their degradation products to the local drainage system, which carries the water to the existing Pump Station No. 3, and the stormwater and irrigation runoff is released to the Feather River. This process would continue in the setback area after completion of the Applicant Preferred Alternative, although stormwater and irrigation runoff in the setback area would drain to the Feather River via the floodplain drainage swale rather than the new Pump Station No. 3. Also, the total use of pesticides, herbicides, and fertilizers, and therefore the potential for these materials to enter the Feather River, would be reduced because approximately 525 acres of existing agricultural land would be taken out of production and converted to grassland, riparian, and other habitat types. However, placing approximately 525 acres of active agricultural land in the setback area would potentially result in a new mechanism for residual pesticides, herbicides, and fertilizers and their degradation products to enter the Feather River system. During highwater events, inundation of agricultural lands in the setback area would result in

extended contact between the river's water and soils potentially containing agricultural contaminants. The area of this contact would vary depending on the height of the river water, but during severe high water events the entire approximately 525 acres of agricultural lands would be inundated. It is unclear at this time what the net effect on releases of agricultural contaminants would be from placing approximately 525 acres of agricultural land in the Feather River floodway, but removing approximately 525 acres of land from production that currently sends runoff to the Feather River. For the purposes of this analysis, a conservative approach is taken and it is assumed that this impact mechanism could result in a violation of a water quality standards or waste discharge requirements or otherwise substantially degrade water quality, and a significant adverse effect would occur.

It should be noted that under the No-Action Alternative (see discussion below) the potential for a catastrophic levee failure in the RD 784 area would remain high. If a levee failure occurred, contaminants from numerous sources—e.g., stored chemicals, stored chemicals, septic systems and ruptured sewage facilities, abandoned vehicles, floating debris—would be released into flood waters and subsequently contaminate surface water or soil and groundwater. Levee repairs conducted as part of the Applicant Preferred Alternative – ASB Setback Levee Alternative would significantly reduce the probability of this water quality impact occurring.

### **3.4.2.3 INTERMEDIATE SETBACK LEVEE ALTERNATIVE**

Under the Intermediate Setback Levee Alternative environmental effects to water quality during project construction and from ongoing agricultural uses would generally be the same, or very similar to those described for the Applicant Preferred Alternative – ASB Setback Levee Alternative, as described below.

#### **ISL Impact 3.4-a: Violate Any Water Quality Standards or Waste Discharge Requirements or Otherwise Substantially Degrade Water Quality during Project Construction**

Construction activities under the Intermediate Setback Levee Alternative would be virtually the same as those for the Applicant Preferred Alternative – ASB Setback Levee Alternative. There would be the same potential for construction activities to disturb existing vegetation cover and soils, expose large areas of disturbed ground that could be subject to rainfall and erosion, and cause temporary discharges of sediment and other contaminants in stormwater runoff to drainage channels and the Feather River. Petroleum products or other construction-related substances (e.g., concrete, hydraulic fluids, solvents) also could be discharged inadvertently to waterways via stormwater runoff. Although temporary erosion control measures would be implemented during construction, some soil erosion and sedimentation of waterways or discharge of contaminated runoff to waterways could occur, resulting in a potentially significant adverse water quality effect, including potential temporary exceedances of water quality standards such as those identified above in Table 3.4-1.

#### **ISL Impact 3.4-b: Violate Any Water Quality Standards or Waste Discharge Requirements or Otherwise Substantially Degrade Water Quality during Project Operation**

Similar to what is described above for the Applicant Preferred Alternative – ASB Setback Levee Alternative, the Intermediate Setback Levee Alternative would result in existing agricultural lands being placed in the setback area and other existing agricultural lands being taken out of production and converted to habitat. The difference between the alternatives is in the acreage of area affected. As described in Section 3.1, "Land Use and Agriculture," after construction of the Intermediate Setback Levee Alternative, it is assumed that approximately 360 acres of existing agricultural land would be retained in active production in the setback area and approximately 360 acres would be taken out of production and converted to habitat. Placing additional actively cultivated agricultural lands in the Feather River floodway could result in additional agricultural contaminants entering the Feather River during high water events when these agricultural lands are inundated. However, it is unclear at this time what the net effect on releases of agricultural contaminants would be from placing approximately 360 acres of agricultural land in the Feather River floodway, but removing approximately 360 acres of land from production that currently sends runoff to the Feather River. For the purposes of this analysis, a conservative approach is taken and it is assumed that this impact mechanism could result in a violation

of a water quality standards or waste discharge requirements or otherwise substantially degrade water quality, and a significant adverse effect would occur.

Similar to the discussion above of the Applicant Preferred Alternative – ASB Setback Levee Alternative, implementation of the Intermediate Setback Levee Alternative would significantly reduce the probability a catastrophic levee breach and associated adverse water quality effects described below for the No-Action Alternative.

#### **3.4.2.4 LEVEE STRENGTHENING ALTERNATIVE**

Under the Levee Strengthening Alternative environmental effects to water quality during project construction would be similar to those described for the Applicant Preferred Alternative – ASB Setback Levee Alternative, as described below. Implementation of this alternative would not result in additional agricultural lands being placed in the Feather River floodway; therefore, potential water quality effects related to this impact mechanism are not addressed.

#### **LS Impact 3.4-a: Violate Any Water Quality Standards or Waste Discharge Requirements or Otherwise Substantially Degrade Water Quality during Project Construction**

Among the construction activities associated with repairing and strengthening the existing Feather River left bank levee in Segment 2 are the following:

- ▶ constructing slurry cutoff walls, stability/seepage berms, and relief wells;
- ▶ repairing levee segments susceptible to erosion;
- ▶ excavating borrow material from borrow sites; and
- ▶ relocating Pump Station No. 3.

These construction activities would disturb existing vegetation cover and soils on the existing levee and in nearby areas, would expose relatively large areas of disturbed ground that could be subject to rainfall and erosion, and could cause temporary discharges of sediment and other contaminants in stormwater runoff to drainage channels and the Feather River. Petroleum products or other construction-related substances (e.g., hydraulic fluids, concrete, solvents) also could be discharged inadvertently to waterways via stormwater runoff.

Although erosion and generation of contaminated runoff are possible during construction of the Levee Strengthening Alternative, anything more than minor releases of sediment is unlikely because most land disturbance would occur during the dry months from late spring through fall. In addition, temporary erosion control measures would be implemented during construction to minimize stormwater pollution resulting from erosion and sediment migration from the construction areas, borrow areas, laydown/staging areas, and disposal areas. Nevertheless, some soil erosion and sedimentation of waterways or discharge of contaminated runoff to waterways could occur, resulting in a significant adverse water quality effect in nearby waterways, including potential temporary exceedances of water quality standards such as those identified above in Table 3.4-1.

Similar to the discussion above of the Applicant Preferred Alternative – ASB Setback Levee Alternative, implementation of the Levee Strengthening Alternative would significantly reduce the probability a catastrophic levee breach and associated adverse water quality effects described below for the No-Action Alternative.

#### **3.4.2.5 NO-ACTION ALTERNATIVE**

If no permissions were granted to alter the existing levee or discharge dredged or fill material into waters of the United States, construction work necessary to completely repair the Segment 2 levee would not be allowed. Under these conditions, heavy underseepage and loss of foundation soils would be expected to continue and the threat of another levee failure would remain. Under the No-Action Alternative, it is possible that localized levee repairs (e.g., correction of identified waterside erosion sites) could be authorized under the federal Clean Water Act



(CWA) Nationwide Permit (NWP) #3. Any levee repair work that was implemented under NWP #3 could potentially involve construction activities that would require submittal of a Notice of Intent to the Central Valley Regional Water Quality Control Board and preparation of a Storm Water Pollution Prevention Plan.

If no action was taken to completely repair this deficient levee segment, the potential for a catastrophic loss of lives and property associated with a levee failure in the RD 784 area would remain high, as described previously. If a levee failure occurred, contaminants from numerous sources—e.g., stored chemicals, septic systems and ruptured sewage facilities, abandoned vehicles, floating debris—also would be released into flood waters and subsequently contaminate surface water or soil and groundwater. Were a levee breach to occur, construction and repair activities in the region could result in the accidental release of contaminants and hazardous materials (e.g., asphalt, paint or other coating material, oil or other petroleum products), sediments, and debris into area waterways.

### 3.4.3 MITIGATION

The following mitigation measure would be applied to the **Applicant Preferred Alternative – ASB Setback Levee Alternative, Intermediate Setback Levee Alternative, and Levee Strengthening Alternative**:

#### **Mitigation Measure 3.4-a: Prepare and Implement a Stormwater Pollution Prevention Plan**

Before the start of any project construction work, site grading, or excavation, Three Rivers Levee Improvement Authority (TRLIA) or its primary construction contractor shall prepare a Stormwater Pollution Prevention Plan (SWPPP) detailing measures to control soil erosion and waste discharges from construction areas and shall submit a Notice of Intent to the Central Valley Regional Water Quality Control Board (RWQCB) for stormwater discharges associated with general construction activity. TRLIA shall require all contractors conducting construction-related work to implement the SWPPP to control soil erosion and waste discharges of other construction-related contaminants. The general contractor(s) and subcontractor(s) conducting the work shall be responsible for constructing or implementing, regularly inspecting, and maintaining the measures in good working order.

The SWPPP shall identify the grading and erosion control best management practices (BMPs) and specifications that are necessary to avoid and minimize water quality impacts to the extent practicable. Standard erosion control measures (e.g., management, structural, and vegetative controls) shall be implemented for all construction activities that expose soil. Grading operations shall be conducted to eliminate direct routes for conveying potentially contaminated runoff to drainage channels. Erosion control barriers such as silt fences and mulching material shall be installed, and disturbed areas shall be reseeded with grass or other plants where necessary.

The SWPPP shall contain specific measures for stabilizing soils at construction-related sites before the onset of the winter rainfall season. These standard erosion control measures shall be designed to reduce the potential for soil erosion and sedimentation of drainage channels.

The following specific BMPs will be included for implementation:

- ▶ Conduct all work according to site-specific construction plans that identify areas for clearing, grading, and revegetation so that ground disturbance is minimized.
- ▶ Avoid riparian and wetland vegetation wherever possible and identify vegetation to be retained for habitat maintenance (i.e., as identified through preconstruction biological surveys), cover cleared areas with mulches, install silt fences near riparian areas or streams to control erosion and trap sediment, and reseed cleared areas with native vegetation.
- ▶ Stabilize disturbed soils at all construction sites and staging areas before the onset of the winter rainfall season.

- ▶ Stabilize and protect stockpiles from exposure to erosion and flooding.

The SWPPP also shall specify appropriate hazardous materials handling, storage, and spill response practices to reduce the possibility of adverse impacts from use or accidental spills or releases of contaminants. Specific measures applicable to the project include, but are not limited to, the following:

- ▶ Develop and implement strict on-site handling rules to keep construction and maintenance materials out of drainages and waterways.
- ▶ Conduct all refueling and servicing of equipment with absorbent material or drip pans underneath to contain spilled fuel. Collect any fluid drained from machinery during servicing in leak proof containers and deliver to an appropriate disposal or recycling facility.
- ▶ Maintain controlled construction staging, site entrance, concrete washout, and fueling areas at least 100 feet away from stream channels or wetlands to minimize accidental spills and runoff of contaminants in stormwater.
- ▶ Prevent raw cement; concrete or concrete washings; asphalt, paint, or other coating material; oil or other petroleum products; or any other substances that could be hazardous to aquatic life from contaminating the soil or entering watercourses.
- ▶ Maintain spill cleanup equipment in proper working condition. Clean up all spills immediately according to the spill prevention and response plan, and immediately notify DFG and the RWQCB of any spills and cleanup procedures.
- ▶ No hazardous materials will be stored on site other than those needed to specifically support construction activities (fuels, lubricants, hydraulic fluids, paints, batteries, etc.).

The following mitigation measure would be applied to the **Applicant Preferred Alternative – ASB Setback Levee Alternative and the Intermediate Setback Levee Alternative**:

### **Mitigation Measure 3.4-b: Comply with Regional Water Quality Control Board Irrigated Lands Requirements**

The Central Valley RWQCB, which has jurisdiction over the project area, operates an Irrigated Lands Division that, among other duties, monitors and regulates agricultural lands within the floodways of rivers in order to protect water quality in the rivers and maintain water quality standards. As part of the Section 401 Water Quality Certification process for the Applicant Preferred Alternative – ASB Setback Levee Alternative, TRLIA has coordinated with the RWQCB regarding ongoing agricultural operations in the setback area. The RWQCB has stated that the Irrigated Lands Division has reviewed the 401 Water Quality Certification application and will include specific conditions in the Water Quality Certification to minimize/mitigate potential releases of agricultural contaminants into the Feather River. TRLIA shall implement these requirements, which according to the RWQCB will include, at a minimum:

- ▶ Obtain regulatory coverage under the Irrigated Lands Conditional Waiver or file a Report of Waste Discharge for all parcels TRLIA owns which are irrigated and have the potential to discharge waste to surface waters.
- ▶ Submit a Management Plan, for review, to the Regional Water Board that addresses what practices will be utilized to prevent waste associated with agricultural operations from entering surface waters of the State.
- ▶ Submit notification to the Regional Water Board if ownership of parcels enrolled in the Irrigated Lands Regulatory Program are transferred.

TRLIA intends to enroll agricultural lands in the levee setback area within the Irrigated Lands Conditional Waiver program. As part of this program, the RWQCB monitors agricultural runoff at various locations in the region and identifies agricultural practices that adversely affect water quality; and pesticides, herbicides, and fertilizers that jeopardize maintenance of water quality standards. The RWQCB uses this data to direct agricultural operators enrolled in the conditional waiver program on methods, operations, and materials to use on their lands that preserve water quality standards.

## 3.5 HAZARDOUS MATERIALS

This section discusses the known and potential occurrences of hazardous materials in the project area and the status of hazardous materials testing in the project study area. The following analysis addresses the potential direct effects of the Applicant Preferred Alternative – Above Star Bend (ASB) Setback Levee Alternative (also referred to as the “Applicant Preferred Alternative”) and other alternatives on water quality that could result from the release of hazardous materials in the project construction area into the environment. The potential for project construction and operation to introduce new sources or mechanisms for releases of hazardous materials into the environment (e.g., use of herbicides and pesticides on agricultural lands placed in the Feather River floodway) are addressed in Section 3.4, “Water Quality.”

Potential indirect effects of the Applicant Preferred Alternative and other alternatives are addressed in Chapter 4.0, “Cumulative and Growth-Inducing Effects.” For example, for a discussion of the effects of disturbing soils containing residual agricultural chemicals from development potentially facilitated by the Applicant Preferred Alternative and other action alternatives, see Section 4.1.2.13, “Risk of Upset/Public Health and Safety.” For a discussion of the combined potential for hazardous materials to be transported to surface waters during construction of past, present, and future flood control projects in the region, see Section 4.2.4.3, “Water Resources and River Geomorphology.”

### 3.5.1 EXISTING CONDITIONS

#### 3.5.1.1 PHASE I ENVIRONMENTAL SITE ASSESSMENTS AND RELATED STUDIES

##### Purpose of the Phase I ESA and General Site Conditions

A Phase I Environmental Site Assessment (Phase I ESA) was conducted on behalf of the Three Rivers Levee Improvement Authority (TRLIA) in the Feather River Levee Repair Project (FRLRP) Segment 2 study area (GEI Consultants 2007). It was conducted in accordance with the American Society for Testing and Materials (ASTM) E1527-05, which addresses the Phase I ESA site assessment process. The purpose of the Phase I ESA was to identify any recognized environmental conditions within the study area. The Phase I ESA satisfies a mitigation requirement of the Environmental Impact Report (EIR) for the FRLRP (TRLIA 2006b). The definition of a recognized environmental condition according to ASTM E1527-05 is as follows:

*The presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property.*

Most land uses in the Phase I ESA study area are agricultural. Some former agricultural lands east of Feather River Boulevard, including the potential eastern borrow area (Figure 3.5-1), are planned or proposed for development by others (i.e., not planned or proposed for development by TRLIA). Based on site investigations for the Phase I ESA, hazardous materials stored and used within the study area generally include diesel fuel, pesticides (including insecticides, herbicides, and fungicides), waste oil, welding material, and stored propane. Stockpiled scrap metal such as racks, vehicle parts, corrugated metal, and empty tanks and barrels were observed on some properties. The FRLRP Segment 2 study area is serviced by private wells and septic systems.

As discussed in Chapter 1, “Purpose of and Need for Action,” the existing left bank levee of the Feather River along the western boundary of Reclamation District 784 follows the east side of the Feather River from the Bear River setback levee tie-in, near Pump Station No. 2, to the Feather River confluence with the Yuba River where the Feather River left bank levee ties into the Yuba River left bank levee. The U.S. Army Corps of Engineers (Corps) completed construction of the existing levees in the project area in 1941. The source of material used to construct the levees is unknown.

## Previous Environmental Site Assessments on the Potential Eastern Borrow Area

Phase I and Phase I/Phase II ESAs were prepared in 2003 and 2004 on behalf of JTS Communities by Wallace-Kuhl & Associates for study areas that included properties within the potential eastern borrow area. These previous ESAs were prepared in accordance with ASTM E1527-00. The Phase II ESAs included investigations of the levels of pesticides that might have been present on the study area properties. The results of these ESAs are discussed in detail in the Phase I ESA prepared for the FRLRP Segment 2 setback levee project (GEI Consultants 2007). GEI Consultants used interview and site reconnaissance information from the previous Phase I and Phase I/Phase II ESAs as data sources to evaluate the suitability of the eastern borrow area as a potential source for soil borrow to construct the proposed FRLRP Segment 2 setback levee. GEI conducted a reconnaissance investigation of the properties in June 2007, at which time two new above ground storage tanks (AGTs) were observed along the north side of the potential borrow area that were not reported in the previous ESAs. Site conditions had not otherwise changed significantly since preparation of the site assessments in 2003 and 2004.

Historical agricultural practices sometimes entailed application of persistent compounds such as arsenic, lead, and Dichlorodiphenyltrichloroethane (DDT). As part of its Phase II ESA, Wallace-Kuhl collected and analyzed soil samples for organochlorine pesticides (including DDT and its degradation compounds), total arsenic, and total lead. The samples were collected from 45 locations on eight parcels within the potential eastern borrow area (Figure 3.5-1). Samples were collected at depths from 6–12 inches below surface grade (bsg). Wallace-Kuhl's testing results were compared to the following benchmarks, as reported in the Phase I ESA prepared by GEI Consultants (2007):

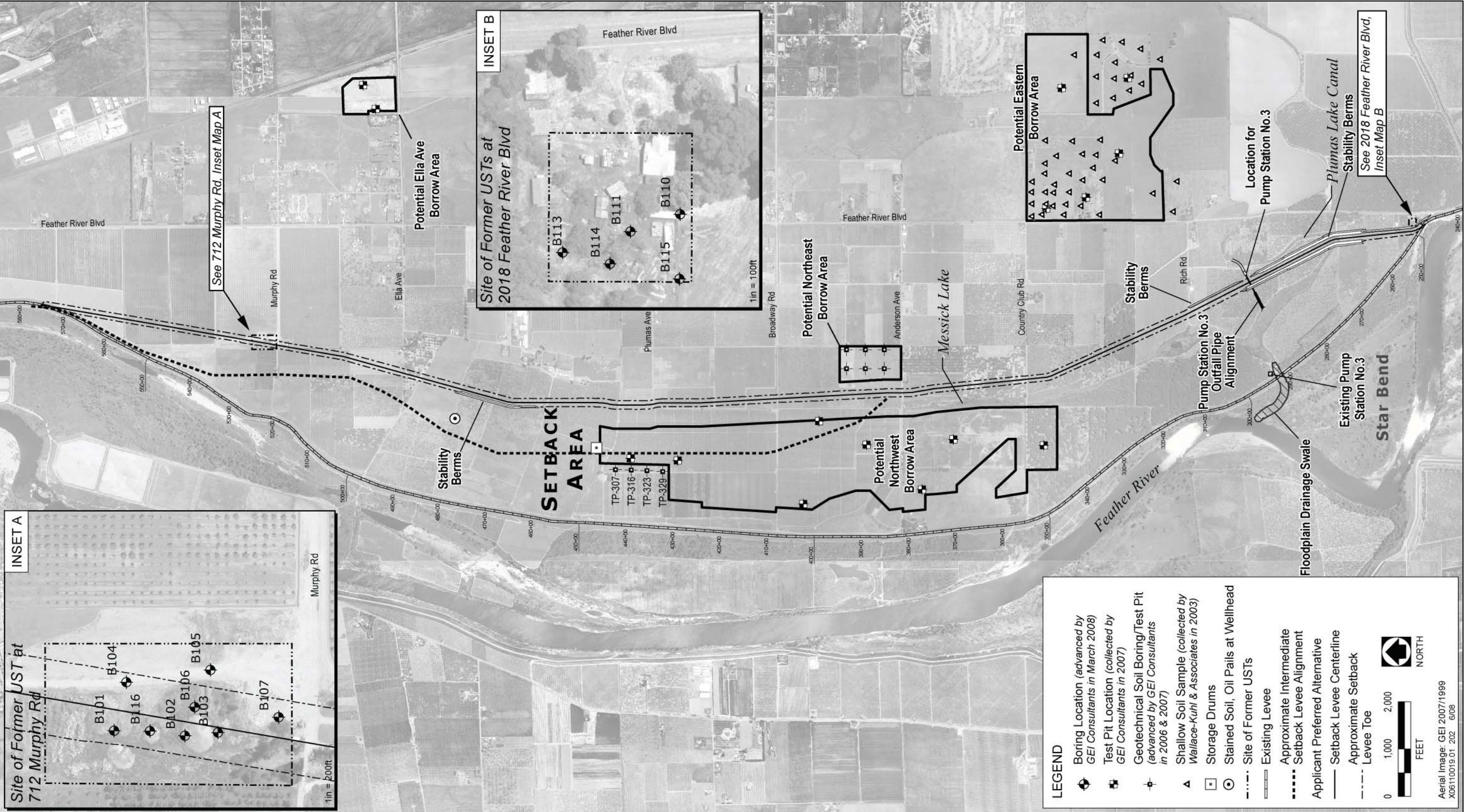
- ▶ Preliminary Remedial Goals (PRGs) for Residential Cleanup: PRGs are published by U.S. Environmental Protection Agency (EPA) Region 9 and are designed to be protective of human health, however, ecological impacts are not addressed. All detected concentrations were below PRGs.
- ▶ Threshold Effects Levels (TEL) for ecological effects in freshwater sediments: TELs are published by the National Atmospheric and Oceanic Administration (NOAA). Concentrations of DDT and its degradation compounds exceeded TELs in some samples (i.e., they were present above background).
- ▶ Background metals concentrations in soil: Metals concentrations were consistent with background levels. Background for organic contaminants was at non-detect.

The application of pesticides is considered a recognized environmental condition. The presence of DDT is not considered reportable under California Health and Safety Code 25359.4 because it is presumed to have been applied legally (i.e., before being banned in 1972). The presence of DDT at concentrations above freshwater sediment TELs does not affect the current land use. As discussed in the Phase I ESA prepared by GEI in 2007, further testing and an analysis of the use of the material is recommended if this top layer of soil (to a depth of 12 inches) is planned for use as borrow to construct the setback levee. However, surface soils are not suitable for setback levee construction. As discussed in Chapter 2.0, "Alternatives," topsoil would be stripped from borrow areas to a depth of approximately 6 to 12 inches (or deeper depending on the type and amount of organic material in the soil) and not be used as fill for the setback levee. Nonetheless, subsequent soil sampling and testing of suitable material below the top soil was performed by GEI Consultants on the potential borrow sites. See the discussions below for further information.

## Recognized Environmental Conditions within or Near the Levee Setback Area

On-site investigations prepared by GEI Consultants in 2007 for the Phase I ESA resulted in identification of a total of 13 recognized environmental conditions within or near the project area. It has since been confirmed that six of those sites are well outside of areas that would be affected by implementation of the Applicant Preferred Alternative – ASB Setback Levee Alternative or other alternatives. Therefore, no disturbances to these sites would occur from project activities and no further discussion of them is necessary.





Source: GEI Consultants 2007, 2008

Hazardous Materials Testing Locations

Figure 3.5-1



The remaining seven recognized environmental conditions identified within or adjacent to the project area include an area with evidence of surface spilling of petroleum products, a drum storage area, two areas where underground storage tanks (USTs) were formerly located, areas within the floodplain where residual mercury could be present in depositional soils, areas where pesticides were applied, and agricultural burn areas and debris piles with evidence of burning. The following descriptions are based on field work and research conducted during preparation of the Phase I ESA:

- ▶ **Stained Soil at 3792 Feather River Boulevard:** Note that 3792 Feather River Boulevard is the mailing address for a large scale agricultural operation that owns multiple parcels in the project area. The address is used as a designation for environmental condition sites on properties owned by this operation. The sites themselves may be several hundred to several thousand feet from the 3792 Feather River Boulevard address. This particular environmental condition site consists of an approximately 9-square-foot (sq. ft.) area of dark staining and an open pail containing pump oil observed next to an irrigation wellhead. The site is located near the eastern boundary of the Applicant Preferred Alternative – ASB Setback Levee Alternative alignment southwest of Ella Road (Assessors Parcel Number [APN] 014-250-027).
- ▶ **Storage Drums at 3792 Feather River Boulevard:** Approximately 10 drums were observed within a debris area near the eastern boundary of the Applicant Preferred Alternative – ASB Setback Levee Alternative alignment west of Plumas Avenue (APN 014-250-027). Labels on the drums indicate that they contain oil and agricultural products. Although no staining or evidence of leakage was apparent near the drums, their storage in an uncontrolled area is considered to present a recognized environmental condition.
- ▶ **Previous Sites of USTs at 2018 Feather River Boulevard:** According to records kept by the Yuba County Environmental Health Department (EHD), an unknown number of USTs were located on this property near the south end of the Applicant Preferred Alternative – ASB Setback Levee Alternative alignment (Figure 3.5-1) that were removed sometime after 1988 (APN 016-010-010). Site conditions in the area where the USTs were located were generally unknown during preparation of the Phase I ESA. A Phase II ESA was subsequently prepared for this site and another UST site at 712 Murphy Road (see below). The details of the Phase II ESA are described later in this section.
- ▶ **Previous Site of UST at 712 Murphy Road:** A UST that was located at the former dairy farm at this address (Figure 3.5-1) near the northern end of the Applicant Preferred Alternative – ASB Setback Levee Alternative alignment was removed around 1990 (APN 013-010-035). Site conditions in the area where the UST was located were generally unknown during preparation of the Phase I ESA.
- ▶ **Potential Presence of Residual Mercury in the Study Area:** Historic gold mining upstream of the FRLRP area in the Yuba River and beyond included the use of mercury. Tailings containing residual mercury would have washed downstream into the Feather River during the mining era and been deposited in varying degrees in river floodplain soils. It was determined during preparation of the Phase I ESA that there was no evidence of a discrete ongoing source of mercury contamination, localized deposits, or adverse conditions that may have been related to mercury, and as a result it was determined that testing for mercury within the study area was unwarranted. Regardless, the testing program for pesticides (described below) screened for the potential presence of mercury in the soil.
- ▶ **Potential Presence of Pesticides in the Study Area:** Historical agricultural uses in the project area included application of pesticides (e.g., insecticides, herbicides, and fungicides), which are known to contain hazardous substances. The application of such substances is a recognized environmental condition under the American Society for Testing and Materials (ASTM) Standard. However, the permitted application of pesticides and herbicides is not reportable as a hazardous substance under state and federal regulations. Releases that are permitted are exempt from reporting under California Health and Safety Code Section 25359.4. The Phase I ESA identified the potential for historical pesticide use to have resulted in persistent pesticides in soils, and recommended testing of soils in areas proposed for use as borrow material. If persistent pesticides are present



in borrow areas, excavation and use of these soils for construction of the setback levee could increase the potential for ecological exposure to chemical constituents in these soils (GEI Consultants 2007). As a result of this recommendation, in September and November 2007, GEI Consultants performed soil sampling and chemical testing of soils taken from 15 sampling locations in potential soil borrow areas in general conformance with the requirements for a Phase II ESA, pursuant to ASTM E1903 (Figure 3.5-1). Soil samples were taken from deeper soil layers (deeper than 12 inches bsg) than had been taken previously by Wallace-Kuhl. Test pits were excavated with a backhoe. Metals detected in the soil appeared to be present at naturally occurring levels, or, in the case of mercury, occurring as a regional condition that would pose no increased human health or ecological risk. The results of testing showed that pesticides (including DDT), Polychlorinated Biphenyls (PCBs), and cyanide were at “non-detect” (i.e., below local natural occurring levels), therefore, it was concluded that the material from the borrow areas would not result in release of harmful chemical constituents to the ecosystem. A memorandum was prepared describing the results of this testing, which is included in Appendix F of this EIS.

- **Agricultural Burn Areas and Other Debris Piles:** Several burn areas and debris piles were identified in the study area, many of them containing metal debris in addition to ash. Ordinary agricultural burning is permitted as a part of agricultural operations in the study area, and this practice is exempt from reporting as a hazardous release under state and federal regulations. However, agricultural burn areas containing metal and other non-agricultural material and other debris could present a hazard if hazardous substances are present in quantities that exceed thresholds specified in Section 25359.4 of the California Health and Safety Code.

### **Geotechnical Soil Boring and Test Pit Logs for the Segment 2 Study Area**

In 2006 and 2007, GEI Consultants advanced 81 soil borings and 401 test pits along the proposed setback levee alignment for Applicant Preferred Alternative – ASB Setback Levee Alternative, the levee setback area, and the potential borrow areas (GEI Consultants 2007). This work was done as part of the geotechnical evaluation of soils for construction of the setback levee and the new levee foundation. GEI Consultants project engineers reviewed logs and interviewed field staff as part of the work to determine the potential presence of subsurface contamination. The only anthropogenic material observed below the ground surface was pieces of asphalt in the upper 1 foot of soil in four of the test pits within the levee setback area (Test Pits 307, 316, 323, and 329 on Figure 3.5-1). Because the asphalt was not observed in several other test pits excavated in dirt access roads in the area, it appears to be localized. The presence of asphalt at the four test pit sites is not considered a recognized environmental condition. No odors, staining, or other indications of soil or groundwater contamination were noted in the boring and test pit logs. Test pits dug throughout the potential eastern borrow area by GEI Consultants in 2007 did not result in identification of additional recognized environmental conditions.

GEI Consultants also reviewed logs for approximately 200 soil borings and 8 test pits performed as part of various geotechnical investigations performed between 1986 and June 2006 within the project study area. These investigations included areas further north and south of the Segment 2 project site. A thin lens of charcoal was noted at one on-site location drilled from the Feather River left bank levee crest at approximately Station 250+00. No odors, staining, or other indications of soil or groundwater contamination were noted in these earlier boring and test pit logs.

Site stratigraphy was obtained from the various geotechnical boring logs. Starting at ground surface and continuing downward, data showed that soils generally consisted of fine sand with variable silt content, silt, sand and gravel, and basal clay. Interbedding was commonly observed, and strata thickness varied widely. The clay unit was generally observed between 70 and 100 feet bsg.

### 3.5.1.2 PHASE II ENVIRONMENTAL SITE ASSESSMENT

#### Purpose of the Phase II ESA and Site Conditions

A draft Phase II ESA was completed in May 2008 on behalf of TRLIA to assess conditions at the two former UST sites listed above at 2018 Feather River Boulevard and 712 Murphy Road (GEI Consultants 2008) (Figure 3.5-1). The Phase II ESA was performed to evaluate whether subsurface contamination related to the former USTs is present at levels that could affect any proposed setback levee alternative or otherwise pose a risk to surrounding human or ecological populations. Soil borings, field screening, and laboratory analytical testing of soil samples were performed to determine whether petroleum products were present in the soil, focusing on the water table and vadose zone just above the water table as the most likely location of impacts. ASTM E1903-02 defines the purpose of a Phase II ESA as follows:

*Evaluate the recognized environmental conditions identified in the Phase I ESA or transaction screen process for the purpose of providing sufficient information regarding the nature and extent of contamination to assist in making informed business decisions about the property; and where applicable, providing the level of knowledge necessary to satisfy the innocent purchaser defense under CERCLA.*

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund, was enacted by Congress on December 11, 1980.

The Phase II ESA includes details on the historical uses and present conditions at the former UST sites:

- ▶ **712 Murphy Road:** This property is currently in agricultural use and is mostly planted with orchard trees. The southwest corner of the property is undeveloped and contains rubble piles from the former Poldervaart Dairy and parking for farm vehicles. The property owner demolished the Poldevaart Dairy structures after purchasing the property in 1990. The subject UST was also removed at that time. Although the exact location of the former UST is not known, historical aerial photographs provide evidence that most of the structures from the former dairy farm were located in an area that is within or near the setback levee footprint associated with the Applicant Preferred Alternative – ASB Setback Levee Alternative and the Intermediate Setback Levee Alternative (Figure 3.5-1). The dairy farm would have included waste lagoons and under-floor pits or tanks for daily animal waste and wash water, and a farm vehicle maintenance area. Aerial photographs show two ponds or lagoons east of the structures. The dairy farm was surrounded by orchards. A database search firm, Environmental Data Resources, reported the presence of one gasoline UST of unknown capacity on the Poldervaart property, which was installed prior to 1985. The tank was removed in 1990 when the other structures were demolished. No records were found regarding the tank removal, and the condition of the tank and the surrounding soil were unknown at the time the tanks were removed.
- ▶ **2018 Feather River Boulevard:** The southeastern portion of this property is unused and contains small abandoned buildings, vehicles, and farm goods and equipment. The northeastern portion contains three residences. The western portion is wooded. The property was inherited by the current owner, and no information regarding previous land uses is available. The Yuba County EHD records indicate that USTs were removed from the property in 1988. The Yuba County EHD file contains a 1988 letter from the County advising the landowner to either close the USTs on the property or to obtain a permit for their use. The letter was returned to the County with a note indicating that the tanks had been removed. Records do not indicate whether contamination or signs of leakage were apparent during removal of the tanks, and the locations of the former USTs were not shown. Historical aerial photographs provide evidence that the USTs were likely within or near the setback levee footprint associated with the Applicant Preferred Alternative – ASB Setback Levee Alternative (Figure 3.5-1).

## **Testing Methods and Results**

### ***Soil Borings***

Soil borings were selected as an appropriate method to evaluate soils at the water table depth. A total of 13 test borings were advanced at the two properties (Figure 3.5-1). Soil samples were collected at continuous intervals from the ground surface to the bottom of each boring. On March 26, 2008, five borings were advanced at 2018 Feather River Boulevard (B110 and B111 and B113–B115). On March 27, 2008, eight borings were advanced at 712 Murphy Road (B101–B107 and B116). The lithology and any visual or olfactory contamination of each subsurface sample were logged. Due to the presence of debris on the 2018 Feather River Boulevard property, one proposed boring (B112) was not advanced because the location was inaccessible; similarly, other boring locations were adjusted slightly from the work plan. All borings were backfilled with cement-bentonite grout.

### ***Soil Screening***

Soil samples from each boring were screened on-site to assess for the potential presence of petroleum, and they were visually screened for potential contamination at all depths. Screening for volatile organic compounds (VOCs) was performed in accordance with professional standards and practices. Testing for the presence of higher molecular weight hydrocarbons was also performed using a hydrophobic dye testing kit. Dye testing is targeted towards higher molecular weight hydrocarbons such as weathered diesel fuel, oils, and tars.

### ***Testing Results***

Stained soil and/or odors indicative of potential contamination were observed in three of the eight soil borings at the 712 Murphy Road property. Stained soil and hydrocarbon-like odors were observed in one of the borings (B102). The staining observed in B102 consisted of a 1-foot-thick zone of dark gray to black staining with a greasy texture. Hydrocarbon-like odors were observed in two additional borings (B101 and B116). In the remaining five borings (B103–B107), no staining or odors were apparent. Borings were varied in depth and were between 16 and 24 feet bsg. The odors consisted of a faint musty odor suggestive of weathered hydrocarbons or organic matter. Stratigraphy within the boring locations consisted of stratified clay and silty sand units. Perched water was observed in a silty sand lens in two borings (B101 and B116) at 10–15 feet bsg. The actual water table was observed at 20 feet bsg.

Screening for VOCs and dye testing were performed on the soil from each location exhibiting staining or odors. No VOCs were detected in any samples. A slight positive response was observed in the dye test results from B102 and B116, indicating potential hydrocarbons. The response was inconclusive due to a faint appearance of the red dye. A dye test was performed on the water table soil sample from B107, and no evidence of contamination was apparent as a result of that test. The soil with apparent staining and odors is perched above the water table, and a clay layer isolates the material from the actual water table. No evidence of contamination was observed at the water table. In addition, no evidence of contamination was observed in the five geotechnical design borings advanced between 2005 and 2007 within the former dairy farm area.

Field screening provided no indications of contamination on the 2018 Feather River Boulevard property. Stratigraphy within the boring locations generally consisted of clay and sandy clay, with sand lenses in some locations. The water table was observed at approximately 26 feet bsg. Inspection of material from the borings provided no evidence of contamination and no odors were observed in any of the borings at 2018 Feather River Boulevard. No VOCs were detected during testing. No evidence of contamination was observed in the six geotechnical design borings advanced on the property.

### ***Analytical Sampling***

Based on the soil screening results, three soil samples were collected for laboratory analysis: one from each boring that had evidence of potential contamination at the 712 Murphy Road property. No evidence of

contamination was apparent at the 2018 Feather River Boulevard property; therefore, in accordance with the work plan, no samples were submitted for laboratory analysis from that property.

The three samples from 712 Murphy Road represented the soil from the 1- to 2-foot-thick impacted zones. The samples were prepared, contained, and transported in accordance with professional standards and practices. The samples were analyzed for the following parameters, in accordance with the work plan:

- ▶ Benzene, Toluene, Ethylbenzene, and Xylene (BTEX)
- ▶ Total Petroleum Hydrocarbons (TPH)—Diesel-Range Organics (DRO)
- ▶ TPH—Gasoline-Range Organics (GRO)
- ▶ Oil and Grease
- ▶ Polychlorinated Biphenyls (PCBs)
- ▶ Resource Conservation and Recovery Act (RCRA) 8 Metals  
(Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium, Silver)
- ▶ Methyl Tert-butyl Ether (MTBE)

No BTEX, TPH, Oil and Grease, or PCBs were detected above the laboratory reporting limits. Three metals were detected in each sample: arsenic, barium, and lead. Arsenic was detected at concentrations above PRGs, but at levels consistent with published regional background levels. Barium and lead were detected at concentrations below PRGs and consistent with published background levels. There is no indication that the presence of metals is attributable to anthropogenic sources.

The laboratory data was reviewed by a GEI Consultants chemist for quality control purposes. “Method blank” and “matrix spike” recovery results were within acceptable control limits<sup>1</sup>. Because no petroleum compounds were detected in samples that exhibited visual indications of potential petroleum residue, the instrument chromatograms were reviewed to confirm the results of laboratory testing. In the samples from B101 and B116, there was no indication of petroleum hydrocarbons at a level below the laboratory reporting limit. In the sample from B102, the chromatogram indicated the presence of material in the DRO range below the reporting limit. Definitive identification of the material was not possible based on the chromatogram. The chromatogram matched most closely a wide mixture of hydrocarbons typical of urban soil, but could also be a naturally occurring material or very degraded petroleum. The chromatogram review findings were consistent with the reported results.

## **3.5.2 ENVIRONMENTAL CONSEQUENCES**

### **3.5.2.1 SIGNIFICANCE CRITERIA**

A project alternative would have a significant impact related to hazardous materials if its construction or operation would:

- ▶ create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the likely release of hazardous materials into the environment; or

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<sup>1</sup> Method blank is a blank solution that has been handled similarly to a sample, and to which the same reagents have been added, that had contact to the same type of vessels and that was treated by a similar procedure. Matrix spike samples are quality control samples employed to evaluate the effect a particular sample matrix has on the accuracy of a measurement.

- ▶ be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, create a significant hazard to the public or environment.

The following analysis addresses direct effects of the Applicant Preferred Alternative – ASB Setback Levee Alternative and other alternatives. Potential indirect effects of the Applicant Preferred Alternative and other alternatives are addressed in Chapter 4.0, “Cumulative and Growth-Inducing Effects.” For example, a discussion of the effects of disturbing soils containing residual agricultural chemicals that could result from development potentially facilitated by the Applicant Preferred Alternative and other action alternatives is included under Section 4.1.2.13, “Risk of Upset/Public Health and Safety.” For a discussion of the potential for hazardous materials to be transported to surface waters during levee repair work when combined with other past, present, and future flood control projects in the area, see Section 4.2.4.3, “Water Resources and River Geomorphology.”

### **3.5.2.2 ASB SETBACK LEVEE ALTERNATIVE**

#### **AP Impact 3.5-a: Create a Significant Hazard to the Public or the Environment through Release of Hazardous Materials into the Environment**

##### ***Potential Long-Term Water Quality Effects from Existing Contamination***

The levee setback area encompassed by the Applicant Preferred Alternative – ASB Setback Levee Alternative has historically been used for intensive agriculture, primarily through planting and cultivation of fruit and nut orchards. The inclusion of these agricultural lands in the Feather River floodway could result in the release of different types of contaminants that currently exist in the soil into river water, such as pesticides and fertilizers, and organic litter and debris containing hazardous substances, during periodic flood events.

However, portions of the existing Feather River floodplain in the project area are currently used for agriculture. In addition, irrigation runoff from lands near the river but outside the floodplain area, including the proposed levee setback area, is currently conveyed to the Feather River via canals and ditches. Preparation of the Phase I ESA on the Segment 2 project site included soil sampling and chemical testing of potential soil borrow areas, including the large potential borrow area within the proposed setback levee area (also known as the potential northwest borrow area) (GEI Consultants 2007). This work resulted in the conclusion that the chemical constituents evaluated were present at non-detect levels. As discussed above, Phase I and Phase I/Phase II ESAs were prepared by Wallace-Kuhl & Associates in 2003 and 2004 on properties within the potential eastern borrow area (GEI Consultants 2007). All samples were collected at depths from 6–12 inches bsg. Test results showed that concentrations of DDT and its degradation compounds were present above background levels in some samples. Because borrow material would be extracted from a much deeper zone than that tested by Wallace-Kuhl & Associates, and based on the results of soil sampling and testing subsequently performed by GEI Consultants on behalf of TRLIA, it is assumed that use of soils from the potential eastern borrow area and the other potential borrow areas would pose no significant increased human health or ecological risk.

Surveys of the levee setback area conducted as part of a Phase I ESA have identified evidence of agricultural burn areas, debris piles with evidence of burning, pesticide handling areas, drum storage areas, former UST sites, and surface spilling of petroleum products. Given historical and current land uses in the project area, it would not be unusual to encounter additional potential contamination sources such as buried burn or debris piles and unrecorded underground storage containers. If previously unidentified contaminants present in soils in the levee setback area were released into nearby surface waters during periodic flooding of the setback area, adverse effects on water quality could occur. Similarly, if unidentified contaminants were present in soils from the proposed borrow areas used to fill borrow sites or construct the setback levee became mobilized during flood conditions and were transported off-site by river flows, adverse effects on water quality could occur.

In addition, portions of the Feather River levee, which would be used to fill the large borrow area within the setback area, were constructed before the existence of many of the regulations governing hazardous wastes and/or

cleanup of contaminated soils, and it is unlikely that the material used to construct the existing levee was tested for the presence of hazardous substances. As discussed above, the existing levees in the project area were constructed in 1941. Although the source of borrow material is unknown, it is reasonable to assume that the material was extracted from rural lands in the vicinity of the project area and/or riverine floodplain deposits, and that the material was probably not derived from sites containing hazardous wastes. However, the potential exists for unidentified chemical constituents to be present within the existing Segment 2 Feather River levee. Although testing of soils samples from test pits and soil borings did not reveal evidence of chemical constituents at concentrations that could cause harm to the environment, the potential exists for hazardous substances to be encountered or for previously unidentified abandoned dump sites to be unearthed during excavation of borrow areas. If areas of contaminated soils are contained within the existing levee or the borrow areas, and if it is used for setback levee construction and filling of borrow sites, hazardous materials could be exposed to flood flows and subject to leaching and mobilization into river water. Therefore, periodic flooding of the levee setback area resulting from the Applicant Preferred Alternative – ASB Setback Levee Alternative could increase the release of hazardous materials into nearby water bodies and potentially result in a significant adverse effect on water quality.

### ***Floodplain Sediment Deposition***

The potential for existing contaminants in the setback area to be released into local waterways is described above in the discussion of long-term water quality effects. There is also the potential for sediments that may currently contain elevated concentrations of trace metals and/or organic constituents to be transported into the proposed levee setback area and deposited there during inundation with flood flows. It is unlikely that the concentrations of constituents deposited in the levee setback area in this way would be as high as those observed in the Feather River low-flow channel because the frequency of inundation would be less than that of the channel. It is also unlikely that sediment constituent concentrations resulting from inundation would be any higher than existing constituent concentrations in the levee setback area. The existing concentration patterns in river sediments are a result of continuous exposure to inputs of chemical contaminants. Conversely, the potential mass of contaminants transported into the proposed levee setback area would be less because of the relatively lower frequency of inundation. Aquatic sediments in the Feather River currently exceed consensus-based guidelines for aquatic life concerns (see Table 3.4-2 and associated discussion in Section 3.4, “Water Quality”); however, concentrations are considerably less than EPA guidance PRGs for human health exposure in residential soils (PRGs are established only for industrial sites and residential sites). Given these conditions, any potential changes in soil concentrations of trace metals and organic compounds in the setback area resulting from inundation would not be sufficient to result in a significant adverse environmental effect.

### **3.5.2.3 INTERMEDIATE SETBACK LEVEE ALTERNATIVE**

Under the Intermediate Setback Levee Alternative environmental effects related to hazardous materials would generally be the same, or very similar to those described for the Applicant Preferred Alternative – ASB Setback Levee Alternative, as described below.

### **ISL Impact 3.5-a: Create a Significant Hazard to the Public or the Environment through Release of Hazardous Materials into the Environment**

#### ***Potential Long-Term Water Quality Effects from Existing Contamination***

Impact mechanisms related to potential long-term effects on water quality under the Intermediate Setback Levee Alternative would be the same as described above for the Applicant Preferred Alternative – ASB Setback Levee Alternative. Contaminants present in soils in the levee setback area at one or more sites could become mobilized during flood conditions and be transported off-site by river flows, adversely affecting water quality. However, fewer potential contaminated sites would become inundated under the Intermediate Setback Levee Alternative due to the smaller size of the setback area. The potential to encounter contaminated soils in the existing levee and at borrow sites would be the same for the Intermediate Setback Levee Alternative as described for the Applicant

Preferred Alternative – ASB Setback Levee Alternative because the same borrow areas and volume of borrow would be used for both alternatives and under both alternatives material from the existing levee would be used to fill the borrow sites.

### ***Floodplain Sediment Deposition***

Impact mechanisms related to contaminated sediments being deposited in the setback area during flood events would be the same for the Intermediate Setback Levee Alternative as described above for the Applicant Preferred Alternative – ASB Setback Levee Alternative. The only difference would be that with a smaller setback area, approximately 1,100 acres rather than 1,300 acres of land would potentially be exposed to sediment deposition during a high water event. Any potential changes in soil concentrations of trace metals and organic compounds in the setback area resulting from inundation would not be sufficient to result in a significant adverse environmental effect.

#### **3.5.2.4 LEVEE STRENGTHENING ALTERNATIVE**

##### **LS Impact 3.5-a: Create a Significant Hazard to the Public or the Environment through Release of Hazardous Materials into the Environment**

The Levee Strengthening Alternative would not include a setback levee and associated floodway expansion, but rather would result in a continuation of the existing levee configuration in the project area. Therefore, implementation of the Levee Strengthening Alternative would not have the potential to result in releases of existing hazardous materials from new lands placed in the floodway or accumulate sediment deposited during high water events that might be contaminated. Strengthening and repairing the existing levee (e.g., installing slurry cutoff walls, landside seepage and stability berms, and relief wells) would not substantially increase the potential for existing contaminated soils to contact surface waters.

#### **3.5.2.5 NO-ACTION ALTERNATIVE**

If no permissions were granted to alter the existing levee or discharge dredged or fill material into waters of the United States, no changes to existing land uses in the levee setback area would occur. Under these conditions, heavy underseepage and loss of foundation soils would be expected to continue and the threat of another levee failure in the Segment 2 project area would remain. Under the No-Action Alternative, it is possible that localized levee repairs (e.g., correction of identified waterside erosion sites) could be authorized under the federal Clean Water Act (CWA) Nationwide Permit (NWP) #3. This work would be unlikely to involve disturbances to areas where potential contaminants could be present in the soil. Impact mechanisms identified for the action alternatives that could result in the release of known or previously unidentified contaminants into the ecosystem would not occur.

If no action was taken to completely repair this deficient levee segment, the potential for a catastrophic loss of lives and property associated with a levee failure in the RD 784 area would remain high, as described previously. If a levee failure occurred, any contaminants potentially present in the soil could be released into flood waters and subsequently drain to downstream surface waters or be spread to adjacent areas.

### **3.5.3 MITIGATION**

The following mitigation measures would be applied to the **Applicant Preferred Alternative – ASB Setback Levee Alternative and Intermediate Setback Levee Alternative**.



### **Mitigation Measure 3.5-a1: Evaluation of Soils, Identification of Hazardous Materials, Disposition of Topsoil**

Before the start of construction, TRLIA or its primary construction contractor shall have a qualified hazardous materials specialist conduct on-site field screening of soil samples from the existing levee sections that would be used to fill borrow sites in the setback area. Soil samples taken from the levee shall be visually screened for potential contamination at all depths. In addition, the qualified hazardous materials specialist shall utilize appropriate field testing kits, based on on-site conditions, to test for contaminants (e.g., DDT field test kits). If the visual screening or use of field test kits indicates the presence of contaminated soil, a qualified specialist shall remove the contaminated soil and perform additional soil screening. Depending on the results of field screening, a qualified hazardous materials specialist shall determine whether laboratory analytical testing of soil samples is to be performed. If it is considered necessary by a qualified specialist, the soil samples shall be evaluated for contaminant residues (e.g., trace metals, organochlorine pesticides, polychlorinated biphenyls) that may be encountered in excavation and grading activities. Wastes that are encountered at hazardous levels shall be treated in accordance with California Code of Regulations (CCR) Title 22 procedures for hazardous materials reporting and disposal. Where the evaluation of soil samples results in detection of wastes above regional background concentrations, the results of the evaluation shall be reported to the RWQCB for classification in the RWQCB's designated waste classification program, and the RWQCB will determine the acceptability of the material for fill of setback area borrow sites based on the potential of the waste to impair water quality and public health. Material that is deemed unsuitable for use in the setback area floodplain will be hauled to an appropriate location outside of the setback area and/or made available for other approved uses.

To ensure that no soils potentially containing persistent compounds are used for construction of the setback levee or to restore lands within the setback area, TRLIA or its primary construction contractor will strip the topsoil (approximately the top 6 to 12 inches) from the eastern borrow area prior to excavation of the site for soil borrow. This topsoil from the eastern borrow site will be stockpiled on an unused area within the site. None of this material will be used to build the new setback levee, and none of it will be used to restore lands within the setback area or to form enhanced drainage features within the setback area. The stockpiled topsoil will be used to complete restoration of the eastern borrow area after it is backfilled with soil from the degraded levee.

For the other borrow areas, some stripping of topsoil will be done before beginning excavation for soil borrow. The top layers of these areas could potentially contain plant material, and stripping the top layer will prevent the incorporation of any such materials into soils that will be used to construct the setback levee. Agricultural burn areas, debris piles, structures, and other potential sources of hazardous materials encountered during stripping of topsoil will be treated as described below in Mitigation Measure 3.5-a2. Topsoil that has been stripped from the borrow areas will be stockpiled and used for borrow area reclamation.

The Ella Avenue borrow area was originally part of the extensive rural agricultural lands in this part of the county, but it has since been used as a source of soil borrow by the Corps for levee repair work in the region. The site is highly disturbed, and the top soil layers are no longer intact. Because no evidence of previous farmland uses remain, minimal stripping of topsoil from the Ella Avenue borrow area will be necessary. This borrow area is adjacent to an existing stormwater detention basin. Once excavation is complete, the Ella Avenue borrow area would not be refilled, but would be connected to the existing detention basin to expand the capacity of the basin.

### **Mitigation Measure 3.5-a2: Implement Recommendations from the Phase I and Phase II ESAs**

TRLIA has developed recommendations to address recognized environmental conditions that were identified during preparation of the Phase I and Phase II ESAs (GEI Consultants 2007, 2008). Before the start of construction, and where project construction activities have the potential to disturb potentially hazardous sites, TRLIA or its construction contractor will implement these recommendations, with guidance and supervision provided by a qualified hazardous materials specialist:

- ▶ **Former UST Site at 712 Murphy Road:** Dye testing and laboratory test results indicated a trace of material that was not identified with the analytical tests performed (GEI Consultants 2008). The material is likely organic deposits related to activities at the former dairy farm, but may also be organic soil residuum attributable to an ancient floodplain vegetative cover now buried under recent alluvium. Because the material was not of a liquid nature, it is not likely related to a former UST. The material does not appear to be present at significant levels or to areal extents that would affect the levee project or otherwise pose risks to surrounding populations. Regardless, soils in the areas where the USTs were located will be visually examined during setback levee foundation and cutoff wall excavation to confirm there are no subsurface UST-related impacts to soil.
- ▶ **Former UST Sites at 2018 Feather River Boulevard:** Although no evidence of UST-related contamination was identified, there remains a possibility that localized impacts may exist in this area. Therefore, soils in the areas where the USTs were located will be visually examined during setback levee foundation and cutoff wall excavation to confirm there are no subsurface UST-related impacts to soil.
- ▶ **Stained Soil at 3792 Feather River Boulevard:** Removal and disposal of identified hazardous materials will occur before construction activities disturb the site. Soils in the area will be screened for the potential presence of residual petroleum contamination. TRLIA's construction contractor will remove the stained soil for proper off-site disposal. Soil screening will be performed to confirm that petroleum staining was limited to the surface. If evidence shows additional contamination (e.g., stained soils or petroleum odors), TRLIA will conduct environmental sampling and testing of soil samples. If concentrations of contaminants exceed allowable levels, TRLIA will perform remedial activities.
- ▶ **Storage Drums at 3792 Feather River Boulevard:** Removal and disposal of identified hazardous materials will occur before construction activities disturb the site. TRLIA's construction contractor will remove the drums for proper off-site disposal. Soil screening will be performed to assess soil conditions beneath the storage area. If evidence of contamination is present (e.g., stained soils or petroleum odors), TRLIA will conduct environmental sampling and testing of soil samples. If concentrations of contaminants exceed allowable levels, TRLIA will perform remedial activities.
- ▶ **Agricultural Burn Areas:** Provided there is no evidence of the presence of other materials, ash and wood from agricultural burnings will be mixed or tilled into existing top soil within parts of the project area that will be excavated. Ash material associated with debris piles will be segregated and removed from the site. TRLIA's construction contractor will till ash from agricultural burning into the topsoil in accordance with this recommendation.
- ▶ **Non-agricultural Debris Piles:** Non-agricultural debris piles and associated ash in the setback area or in areas that will be excavated will be removed and disposed of at an appropriate off-site landfill. Analytical testing of the soil will be required to fulfill landfill permit requirements and to confirm that the material is not considered a hazardous waste based on standards contained in the RCRA. Analytical testing of soil from areas beneath potentially hazardous debris sites will be conducted to evaluate whether a reportable release exists. Potential hazardous debris sites include areas beneath vehicle storage and maintenance garages, irrigation wellheads, AGTs, dense brush, and scrap piles. After debris is removed, TRLIA inspectors will screen the underlying soil for contamination. If contaminated soil is encountered, TRLIA will remove the contaminated soil and perform additional soil screening.
- ▶ **Potentially Hazardous Containers and Structures:** The project area will be cleared of containers and AGTs containing petroleum or other hazardous materials. Analytical testing of soils beneath any AGTs or drums in the project area will be conducted to evaluate whether a reportable release exists. All site structures within construction areas will be removed and disposed of at an appropriate off-site location. Following removal of AGTs or other containers, and if stained soils are encountered, screening of underlying soils will be conducted to confirm the extent of petroleum staining. If there is evidence of contamination at depth

(e.g., stained soils or petroleum odors), TRLIA will conduct environmental sampling and testing of soil samples. If concentrations of contaminants exceed allowable levels, TRLIA will perform remedial activities.

- ▶ **Soil Monitoring at Potentially Contaminated Sites:** Monitoring of soil conditions will be conducted in areas of dense brush, beneath soil piles or plowings, around irrigation wellheads and pump stations, and beneath AGTs and garages. TRLIA inspectors will monitor soil conditions in area affected by construction. If contaminated soil is encountered, TRLIA will remove the contaminated soil and perform additional soil screening.
- ▶ **Septic Systems and Wells:** Residential septic systems and leach fields, and residential and irrigation wells will be inventoried, abandoned, and decommissioned in accordance with applicable regulations. Irrigation wells in the setback area will be retained to support ongoing agricultural operations and potential future habitat restoration activities. Test pits will be excavated in areas where leach fields were located, and these areas will be examined to determine the potential presence of hazardous materials in underlying soil. If contaminated soil is encountered, TRLIA will remove the contaminated soil and perform additional soil screening.

## 3.6 WATERS OF THE UNITED STATES AND WETLANDS

Information on waters of the United States (U.S.), including wetlands, subject to U.S. Army Corps of Engineers (Corps) jurisdiction under Section 404 of the Clean Water Act (CWA) is the focus of this section. Aquatic habitats in the project vicinity are also described in Section 3.8, “Fisheries.” Effects of the project on special-status biological resources in the project area are separately addressed in Section 3.9, “Special-Status Biological Resources.”

The following analysis addresses direct effects of the Applicant Preferred Alternative – Above Star Bend (ASB) Setback Levee Alternative (also referred to as the “Applicant Preferred Alternative”) and other alternatives. Potential indirect effects of the Applicant Preferred Alternative and other alternatives are addressed in Chapter 4.0, “Cumulative and Growth-Inducing Effects.” For example, fill of jurisdictional habitats from development potentially facilitated by removal of flood protection as an impediment to growth under the Applicant Preferred Alternative and other action alternatives are discussed under Section 4.1.2.6, “Biological Resources.” A discussion of cumulative benefits to biological resources, including jurisdictional habitats, from various past, present, and future flood control projects in the region that include a habitat enhancement component (e.g., the Bear River Setback Levee Project), is included in Section 4.2.4.5, “Terrestrial Biological Resources.”

In accordance with Section 404 of the CWA, the Corps regulates discharge of dredged or fill material into waters of the U.S. Waters of the U.S. and their lateral limits are defined in Title 33, Part 328.3(a) of the Code of Federal Regulations (CFR) to include:

- ▶ navigable waters of the U.S.,
- ▶ interstate waters,
- ▶ all other waters where the use or degradation or destruction of the waters could affect interstate or foreign commerce,
- ▶ tributaries to any of these waters, and
- ▶ wetlands that meet any of these criteria or that are adjacent to any of these waters or their tributaries.

Waters of the U.S. are often categorized as “jurisdictional wetlands” (i.e., wetlands over which the Corps exercises jurisdiction under Section 404 of the CWA) and “other waters of the U.S.” when habitat values and characteristics are being described. “Fill” is defined as any material that replaces any portion of a water of the U.S. with dry land or that changes the bottom elevation of any portion of a water of the U.S. Any activity resulting in the placement of dredged or fill material within waters of the U.S. requires a permit from the Corps.

Information on the type and location of wetlands and waters of the U.S. presented in this section is based on a wetland delineation that was submitted to the Corps in June 2007. A Section 404 individual permit application was also submitted to the Corps in June 2007. The wetland delineation maps were subsequently revised and resubmitted to the Corps in September 2007. An approved jurisdictional determination was completed on March 11, 2008. An updated jurisdictional determination was provided on September 30, 2008 that reflected a correction to a previous mapping error. In the original delineation a non-jurisdictional area was inadvertently mapped as a wetland. This was corrected in fall 2008 and the updated jurisdictional determination reflects this correction. A copy of the preliminary delineation, the revised maps, the individual permit application, and the jurisdictional determinations are provided in Appendix B. As part of the Section 404 individual permit process, an analysis of project alternatives was prepared; the Section 404(b)(1) alternatives analysis for the project was submitted to the Corps in August 2007 (also in Appendix B).

On May 7, 2008, a wetland delineation was conducted by EDAW wetland ecologist, Sarah A. N. Bennett, on the potential borrow site located north of Anderson Avenue along the east side of the proposed setback levee alignment (the northeast borrow area) (see Chapter 2.0, “Alternatives,” for a description of the potential borrow sites). On the same day, a wetland delineation was conducted on the potential borrow site along the north side of Ella Avenue. Formal wetland delineations for these two potential borrow sites are in preparation and will be submitted to the Corps. Based on the results of the preliminary wetland surveys, no jurisdictional features were identified on either of these properties.

In 2005, a wetland delineation was completed on behalf of JTS Communities for the Country Club Estates project, which encompasses the proposed eastern borrow area on the east side of Feather River Boulevard (see Chapter 2.0, “Alternatives”). The preliminary wetland delineation resulted in identification of approximately 4.15 acres of jurisdictional waters of the U.S. within the study area for that project. The Corps issued a verification letter to JTS Communities in November 2006 (attached to the wetland delineation prepared for Segment 2 of the FRLRP, see Appendix B). The verification is valid for 5 years following the date of issuance. The jurisdictional features that were identified as waters of the U.S. for the Country Club Estates project are outside of the area proposed for use as a borrow site for the FRLRP Segment 2 project.

In accordance with Section 401 of the Clean Water Act, projects that apply for a Corps permit for discharge of dredged or fill material must obtain water quality certification from the appropriate regional water quality control board (RWQCB) indicating that the project will uphold state water quality standards. An application for water quality certification has been submitted by Three Rivers Levee Improvement Authority (TRLIA) to the Central Valley RWQCB for the Applicant Preferred Alternative.

### 3.6.1 EXISTING CONDITIONS

#### 3.6.1.1 JURISDICTIONAL HABITATS WITHIN THE DELINEATION AREA

A total of 114.85 acres of potentially jurisdictional waters of the U.S., including wetlands, have been identified within the wetland delineation study area (Table 3.6-1). Habitat types shown in this table that do not meet established wetland criteria are developed areas, orchard, and ruderal. These habitats are located in areas within the ordinary high water mark (OHWM) of the Feather River, which makes them subject to Corps jurisdiction under Section 404 of the CWA.

| <b>Table 3.6-1</b><br><b>Acreages of Jurisdictional Habitats within the Delineation Study Area</b>                                                       |             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| Habitat Type                                                                                                                                             | Total Acres |
| Riparian Forest/Scrub                                                                                                                                    | 43.10       |
| Riparian Forest/Scrub within the Feather River OHWM                                                                                                      | 30.09       |
| Perennial Drainage                                                                                                                                       | 19.71       |
| Elderberry Savanna                                                                                                                                       | 9.56        |
| Orchard                                                                                                                                                  | 8.06        |
| Intermittent Drainage                                                                                                                                    | 1.55        |
| Lacustrine                                                                                                                                               | 1.38        |
| Ruderal                                                                                                                                                  | 1.36        |
| Developed                                                                                                                                                | 0.04        |
| Total – Waters of the U.S., Including Wetlands                                                                                                           | 114.85      |
| Source: Preliminary Delineation of Waters of the United States, Including Wetlands for the Feather River Levee Repair Project, Segment 2, see Appendix B |             |

### 3.6.1.2 JURISDICTIONAL HABITAT TYPES

Each of the habitat types listed in Table 3.6-1 is described briefly below. Detailed descriptions are included in the preliminary wetland delineation for Segment 2 of the FRLRP (Appendix B). The locations of these jurisdictional habitats are shown in Figures 3.6-1a and 3.6-1b, “Jurisdictional Waters of the United States within the Delineation Study Area.”

#### Developed

The Star Bend Boat Launch facility totals 0.04 acre and is located within the Feather River OHWM at the south end of Segment 2. It is subject to Corps jurisdiction as a waters of the U.S.

#### Elderberry Savanna

Elderberry savanna is characterized by open stands of blue elderberry (*Sambucus mexicanus*) with an annual grassland understory. This habitat type occurs between the existing levee and the Feather River, in areas of the Feather River corridor where disturbances have created large gaps in the dense canopies of the mixed and Valley oak riparian communities. Other species in this community include coyote brush (*Baccharis pilularis*), valley oak (*Quercus lobata*), and prickly lettuce (*Lactuca serriola*).

Based on study area data, it was determined that 9.56 acres of the elderberry savanna are located within the OHWM of the Feather River.

#### Intermittent Drainage

Four intermittent drainages were mapped within the delineation study area. Intermittent drainages are drainages supported by both groundwater sources and rainwater runoff and typically only flow during the winter rainy season. Intermittent drainages identified in the delineation study area include a small portion of the unnamed tributary to Clark Slough, which begins northwest of Messick Lake. A riparian forest, dominated by willow species and with a mono-floristic understory composed of Santa Barbara sedge, is present along this intermittent drainage.

The second intermittent drainage supports a narrow band of riparian forest habitat. It connects to a perennial drainage in the study area, which flows in a westerly direction and connects to the channelized remnant of Plumas Lake Canal east of Feather River Boulevard. Plumas Lake Canal is hydrologically connected to Clark Slough, a tributary of the Feather River and a navigable water of the U.S.

The third intermittent drainage follows the edge of an agricultural field, outside of the levee setback area. It is characterized by hydrophytic vegetation, including duckweed (*Lemna minor*), tall flat sedge (*Cyperus eragrostis*), narrowleaf cattail (*Typha angustifolia*), and curly dock (*Rumex crispus*). The drainage has an OHWM of approximately 12 feet. This drainage is hydrologically connected to the channelized remnant of Plumas Lake Canal.

The fourth intermittent drainage is in the riparian forest/scrub habitat between the Feather River and the existing levee. It is a tributary to the Feather River. This drainage was mapped based on topographic map data (U.S. Geological Survey [USGS] Olivehurst 7.5-minute quadrangle) rather than on data collected in the field due to the dense vegetation, including armed species such as Himalayan blackberry (*Rubus discolor*). The OHWM was estimated to be 8 feet wide based on aerial imagery. Based on field surveys and data interpretation, it was determined that 1.55 acres of intermittent drainage are located within the study area boundary.

## Lacustrine

Lacustrine habitats are defined as inland depressions or dammed riverine channels containing standing water. Lacustrine habitats may range in size from several square meters to large areas covering several square miles. Their depths can vary from a few centimeters to several meters deep.

Several small lakes are present between the existing levee and the Feather River in the northern portion of the study area. These areas total approximately 1.38 acres. The lacustrine habitat present in the study area formed in an area that appears to be an old channel of the Feather River or old borrow pits. Submerged rooted plants including water milfoil (*Myriophyllum* sp.) and hydrilla (*Hydrilla verticillata*) were observed. The lacustrine habitats present within the study area boundary total approximately 1.38 acres.

## Riparian Forest/Scrub

Riparian forest/scrub occurs as a broad to narrow band of vegetation within the floodplain of the Feather River. This habitat is also found adjacent to drainages, outside of the existing Feather River levee, along some of the intermittent drainages. Riparian habitat is characterized by a complex structure and the dominance of its component species varies along the river.

Within the delineation study area the upper canopy of the mixed riparian forest is typically dominated by valley oak, Fremont cottonwood (*Populus fremontii*), box elder (*Acer negundo*), shining willow (*S. lucida* spp. *lasiandra*), red willow (*S. laevigata*), and Oregon ash (*Fraxinus latifolia*). White alder (*Alnus rhombifolia*), northern California black walnut (*Juglans californica* var. *hindsii*), and western sycamore (*Platanus racemosa*) are also present in the upper canopy.

The lower shrub canopy is very dense and thicket-like. The dominant species are California rose (*Rosa californica*), blue elderberry, Himalayan blackberry, and shrub-like forms of the various willow species listed above. Lianas such as California grape (*Vitis californica*) and virgin's bower (*Clematis ligusticifolia*) are also found in the shrub layer. The herbaceous understory ranges from very developed to sparse depending on the amount of light filtering through the upper canopies, but typically includes various grasses, sedges, and rushes. The mixed riparian forest along the existing Feather River levee is very dense and consists mostly of even-aged trees, with scattered, more established trees in some areas.

Based on data from the final wetland delineation maps that were approved by the Corps, acreages of riparian forest/scrub subject to Corps jurisdiction include approximately 30.09 acres of habitat that is located within the Feather River OHWM. An additional approximately 43.10 acres of this type of jurisdictional habitat is located outside the Feather River OHWM and met the three criteria parameters of vegetation, soils, and hydrology to be classified as a wetland.

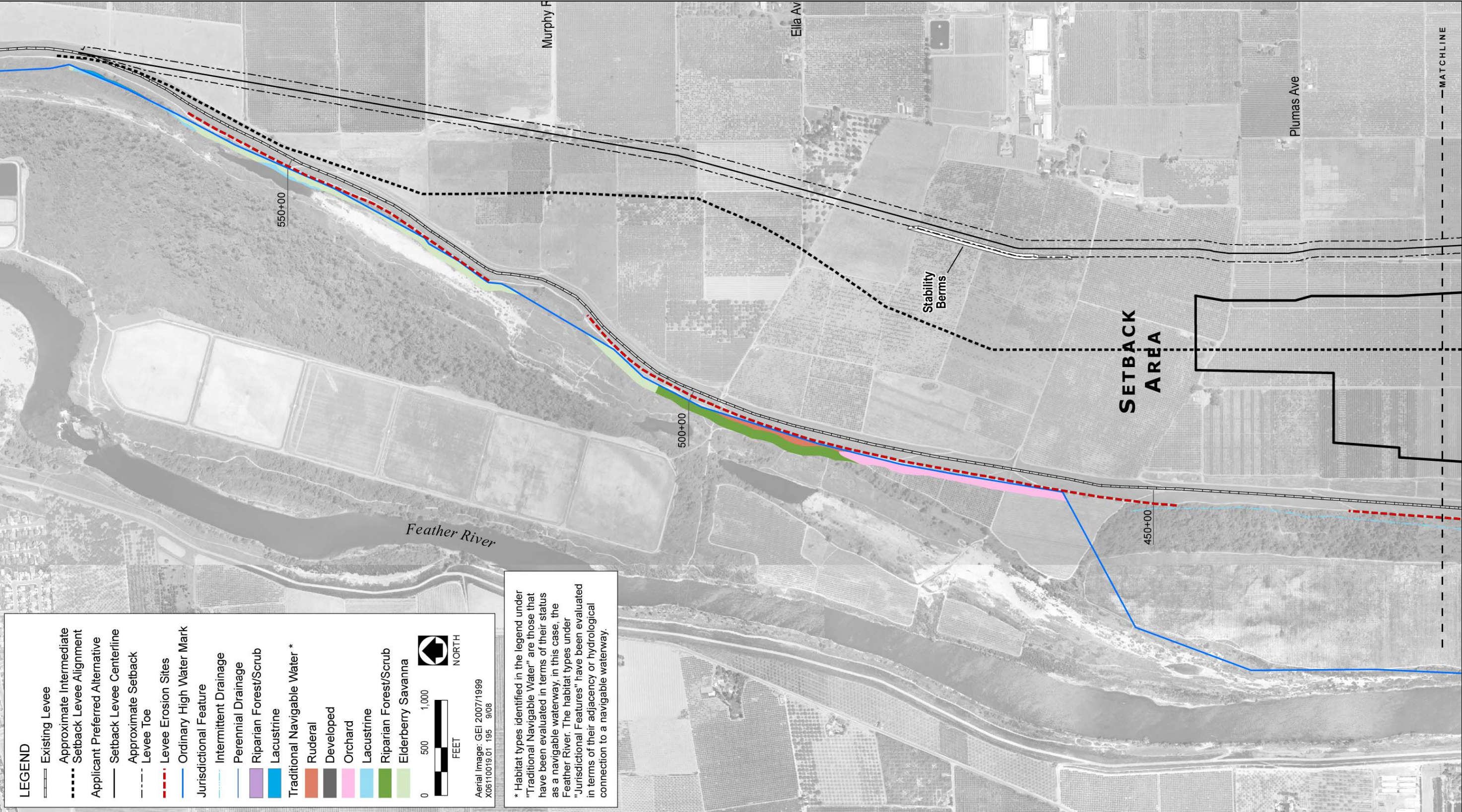
## Perennial Drainage

Perennial drainages flow year round and are supported by both groundwater sources and precipitation events. The Feather River is the predominant perennial drainage in the project vicinity, but it is located outside of the project site and the delineation study area. The perennial drainage within the study area that would be affected by the Segment 2 project is Messick Lake, which has an OHWM of approximately 30 feet. It flows into an unnamed slough within the levee setback area, and then flows across the southern study area boundary where it becomes a channelized remnant of Plumas Lake Canal east of Feather River Boulevard. Perennial drainage totals approximately 19.71 acres in the study area.

## Ruderal

A small ruderal habitat area totaling 1.36 acres is located adjacent to the toe of the Feather River levee, and it is subject to Corps jurisdiction because of its location within the OHWM of the Feather River.



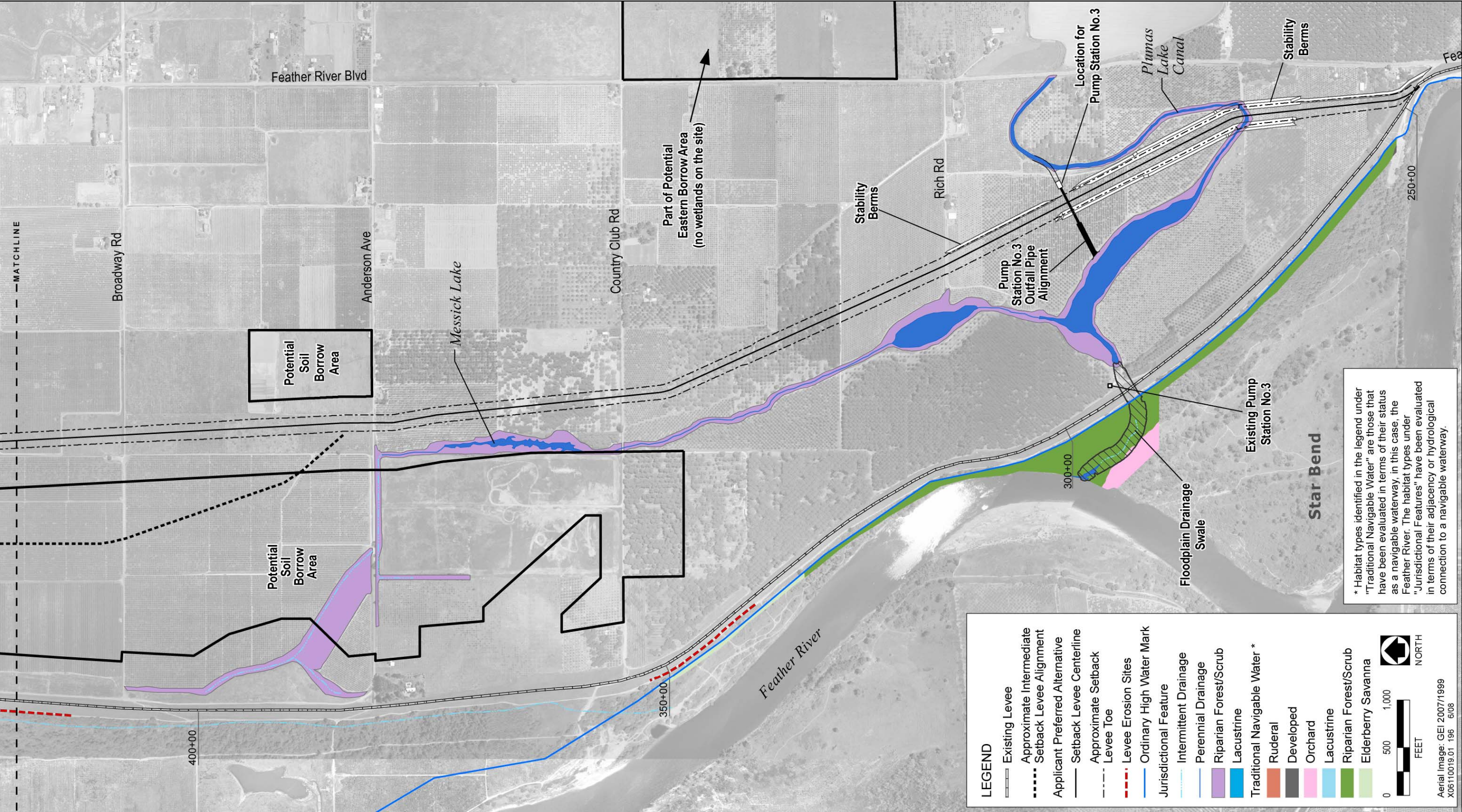


Source: Preliminary Delineation of Waters of the U.S., Including Wetlands, Segment 2 of the FRLRP, see Appendix B

Jurisdictional Waters of the United States within the Segment 2 Delineation Study Area

Figure 3.6-1a





Source: Preliminary Delineation of Waters of the U.S., Including Wetlands, Segment 2 of the FRLRP, see Appendix B

Jurisdictional Waters of the United States within the Segment 2 Delineation Study Area

Figure 3.6-1b



## Orchard

Orchards are present throughout the delineation study area, including the area between the Feather River and the existing levee. Based on data from the final wetland delineation maps that were approved by the Corps, an 8.06-acre portion of the orchard habitat present within the study area is subject to Corps jurisdiction because it is determined to be within the Feather River OHWM.

### 3.6.2 ENVIRONMENTAL CONSEQUENCES

#### 3.6.2.1 SIGNIFICANCE CRITERIA

A project alternative would have a significant direct impact on jurisdictional waters of the U.S., including wetlands, if it would:

- ▶ have a substantial adverse effect on federally protected waters of the United States, including wetlands, as defined by Section 404 of the CWA (including but not limited to marshes, vernal pools, rivers, etc.) through direct removal, filling, hydrological interruption, or other means.

The following analysis addresses direct effects of the Applicant Preferred Alternative – ASB Setback Levee Alternative and other alternatives. Potential indirect effects of the Applicant Preferred Alternative and other alternatives are addressed in Chapter 4.0, “Cumulative and Growth-Inducing Effects.” For example, fill of jurisdictional habitats from development potentially facilitated by removal of flood protection as an impediment to growth under the Applicant Preferred Alternative and other action alternatives are discussed under Section 4.1.2.6, “Biological Resources.” A discussion of cumulative benefits to biological resources, including jurisdictional habitats, from various past, present, and future flood control projects in the region that include a habitat enhancement component (e.g., the Bear River Setback Levee Project), is included in Section 4.2.4.5, “Terrestrial Biological Resources.”

#### 3.6.2.2 APPLICANT PREFERRED ALTERNATIVE – ASB SETBACK LEVEE ALTERNATIVE

##### **AP Impact 3.6-a: Adverse Effect on Federally Protected Waters of the United States, Including Wetlands, As Defined by Section 404 of the CWA**

The Applicant Preferred Alternative – ASB Setback Levee Alternative would result in removal or disturbance of 10.9 acres of waters of the U.S., including portions of the Plumas Lake Canal within the setback levee footprint (Table 3.6-2 and Figure 3.6-2). Implementation of the Applicant Preferred Alternative would have no effect on waters of the U.S. anywhere within the study area north of Broadway Road.

Of the total 10.9 acres of waters of the U.S. to be affected, 6.7 acres would be permanently filled/removed, as follows:

- ▶ the portion of the Plumas Lake Canal within the setback levee footprint,
- ▶ segments of the Plumas Lake Canal on either side of the setback levee alignment to minimize the potential for underseepage that could result from having an excavated feature too close to the levee, and
- ▶ the area adjacent to the Plumas Lake Canal on the east side of the setback levee where the new Pump Station No. 3 would be installed.

| <b>Table 3.6-2<br/>Acreages of Waters of the U.S. Affected by the Project Alternatives</b>                                             |                                                            |                                                                 |                                                  |
|----------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|-----------------------------------------------------------------|--------------------------------------------------|
| Habitat Type                                                                                                                           | Removal or Disturbance of Waters of the U.S. – Total Acres | Placement of Waters of the U.S. in the Floodplain – Total Acres | Erosion Repairs Below the OHWM – Estimated Acres |
| <b>Applicant Preferred Alternative – ASB Setback Levee Alternative</b>                                                                 |                                                            |                                                                 |                                                  |
| Perennial Drainage                                                                                                                     | 2.4                                                        | 16.9                                                            |                                                  |
| Riparian Forest/Scrub                                                                                                                  | 8.4                                                        | 38.0                                                            |                                                  |
| Intermittent Drainage                                                                                                                  | 0.1                                                        | 0.8                                                             |                                                  |
| <b>Total</b>                                                                                                                           | <b>10.9</b>                                                | <b>55.7</b>                                                     | <b>NA</b>                                        |
| <b>Intermediate Setback Levee Alternative</b>                                                                                          |                                                            |                                                                 |                                                  |
| Perennial Drainage                                                                                                                     | 2.4                                                        | 16.9                                                            |                                                  |
| Riparian Forest/Scrub                                                                                                                  | 8.4                                                        | 38.0                                                            |                                                  |
| Intermittent Drainage                                                                                                                  | 0.1                                                        | 0.8                                                             |                                                  |
| <b>Total</b>                                                                                                                           | <b>10.9</b>                                                | <b>55.7</b>                                                     | <b>NA</b>                                        |
| <b>Levee Strengthening Alternative</b>                                                                                                 |                                                            |                                                                 |                                                  |
| Perennial Drainage                                                                                                                     | 0.1                                                        |                                                                 |                                                  |
| Riparian Forest/Scrub                                                                                                                  | 0.2                                                        |                                                                 |                                                  |
| Intermittent Drainage                                                                                                                  | 0.1                                                        |                                                                 |                                                  |
| <b>Total</b>                                                                                                                           | <b>0.4</b>                                                 | <b>NA</b>                                                       | <b>3.6</b>                                       |
| Source: Clean Water Act Section 404(b)(1) Alternatives Analysis for the Feather River Levee Repair Project, Segment 2, see Appendix B. |                                                            |                                                                 |                                                  |

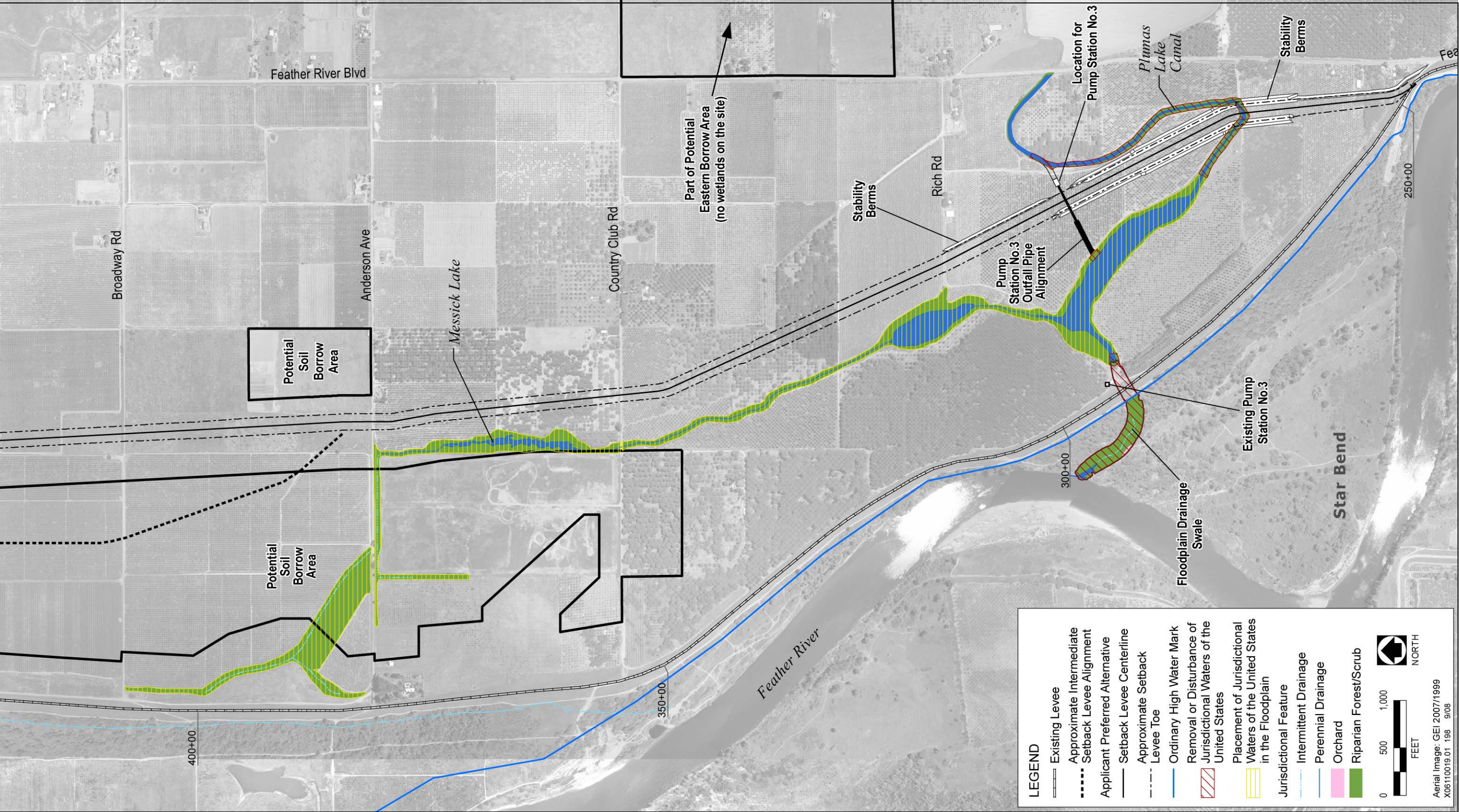
The remaining 4.2 acres of jurisdictional habitats would be disturbed, but not permanently filled/removed by the project, as follows:

- ▶ the area that would be excavated to remove the existing Pump Station No. 3, including removal of riparian vegetation and excavation of a small area around the pump station;
- ▶ riparian vegetation that would be removed from the existing shallow swale between the existing levee and the Feather River channel; and
- ▶ the area along the existing shallow swale that would be excavated and graded to create the floodplain drainage swale.

Once all or portions of the existing levee are removed, additional grading and excavation would be done to connect the Plumas Lake Canal to the enhanced floodplain drainage swale. These project construction activities would change the character of 4.2 acres of jurisdictional waters, but no net loss of acreage of waters of the U.S. would occur as a result. Although 3.8 acres of riparian habitat would be temporarily removed from the project site, construction of the floodplain drainage swale would add to the total acreage of open water habitat in the project area. Table 3.6-3 summarizes the nature of the temporary impacts to jurisdictional waters of the U.S. associated with the project.

The Applicant Preferred Alternative would place 55.7 acres of already existing waters of the U.S. in the new floodplain. (The land will be on the waterside of the levee under this alternative. See Table 3.6-2 and Figure 3.6-2.) Much of the habitat on the waterside of the existing Feather River levee is considered sensitive. However, trees and other shrubs do not exist on the waterside levee surface. Activities involving removal of the





Source: Section 404(b)(1) Alternatives Analysis, Segment 2 of the FRLRP, see Appendix B

Effects to Jurisdictional Waters of the United States, Including Wetlands

Figure 3.6-2



existing levee, which would occur along the levee crown and the landside of the levee, would not adversely affect sensitive habitats within the Feather River floodway. Once the existing levee is removed, occasional inundation of the setback area during periodic flood events is not expected to have an adverse effect on the functions and values of jurisdictional features in this area. Habitats in this area associated with wetlands and waters of the U.S. are tolerant of inundation and would provide the same or increased habitat, hydrologic, and other values after removal of the existing levee as they do under existing conditions.

**Table 3.6-3  
Temporary Effects to Waters of the U.S.**

| Construction Activity                                                                                                                           | Impacted Jurisdictional Waters (acres)                                                     | Jurisdictional Waters Created (acres)              | Jurisdictional Waters Gained (acres) |
|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|----------------------------------------------------|--------------------------------------|
| Decommission and removal of Pump Station No. 3, including removal of riparian vegetation and excavation of a small area around the pump station | – 0.3 acre (includes 0.1 acre of perennial drainage and 0.2 acre of riparian forest/scrub) |                                                    |                                      |
| Removal of riparian vegetation from the existing shallow swale between the existing levee and the Feather River channel                         | – 3.6 acres (riparian forest/scrub)                                                        |                                                    |                                      |
| Excavation and grading of the existing shallow swale to create the floodplain drainage swale                                                    | – 0.3 acre (open water)                                                                    |                                                    |                                      |
| <b>Subtotal</b>                                                                                                                                 | <b>– 4.2 acres</b>                                                                         | <b>NA</b>                                          | <b>NA</b>                            |
| Degradation of a small section of the existing levee to establish a connection between the Plumas Lake Canal and the floodplain drainage swale  |                                                                                            | + 1.8 acres (open water)                           |                                      |
| Creation of the floodplain drainage swale                                                                                                       |                                                                                            | + 4.2 acres (open water)                           |                                      |
| <b>Subtotal</b>                                                                                                                                 | <b>NA</b>                                                                                  | <b>+ 6.0 acres</b>                                 | <b>NA</b>                            |
| <b>Total</b>                                                                                                                                    | <b>– 4.2 acres: effects to perennial drainage, riparian, and open water habitats</b>       | <b>+ 6.0 acres: increase in open water habitat</b> | <b>+ 1.8 acres</b>                   |

Because construction of the Applicant Preferred Alternative would result in direct disturbance to a total of 10.9 acres of jurisdictional features, and 6.7 acres of this area would be permanently filled/removed, this alternative would result in a substantial adverse effect on federally protected waters of the U.S., including wetlands, as defined by Section 404 of the CWA. Therefore, a significant adverse impact would occur.

### **3.6.2.3 INTERMEDIATE SETBACK LEVEE ALTERNATIVE**

#### **ISL Impact 3.6-a: Adverse Effect on Federally Protected Waters of the United States, Including Wetlands, As Defined by Section 404 of the CWA**

The Intermediate Setback Levee Alternative would have the same impacts to waters of the U.S. as those described above for the Applicant Preferred Alternative – ASB Setback Levee Alternative (see Table 3.6-2). The Intermediate Setback Levee Alternative would match the alignment of the Applicant Preferred Alternative for approximately 1.6 miles in the south and then would follow an alignment approximately 1,000 feet (maximum) to the west of the Applicant Preferred Alternative’s setback levee alignment. The impacts on jurisdictional waters, including the Plumas Lake Canal, occur within the “shared” southern alignment for the two setback levee alternatives.

As described for the Applicant Preferred Alternative, construction of the Intermediate Setback Levee Alternative would result in removal or disturbance of 10.9 acres of waters of the U.S., including portions of the Plumas Lake Canal within the setback levee footprint (Table 3.6-2). Of the total 10.9 acres that would be disturbed, 6.7 acres of waters of the U.S. would be permanently filled/removed, as described above for the Applicant Preferred Alternative. Likewise, the remaining 4.2 acres of jurisdictional habitats would be disturbed, but would not be permanently filled/removed by the project.

As described for the Applicant Preferred Alternative, the Intermediate Setback Levee Alternative would place 55.7 acres of already existing waters of the U.S. in the new floodplain. (The land will be on the waterside of the levee under this alternative.) Implementation of the Intermediate Setback Levee Alternative would have no effect on waters of the U.S. anywhere within the study area north of Broadway Road. (Figure 3.6-2).

Because construction of the Intermediate Setback Levee Alternative would result in direct disturbance to a total of 10.9 acres of jurisdictional features, and 6.7 acres of this area would be permanently filled/removed, this alternative would result in a substantial adverse effect on federally protected waters of the U.S., including wetlands, as defined by Section 404 of the CWA. Therefore, a significant adverse impact would occur.

### **3.6.2.4 LEVEE STRENGTHENING ALTERNATIVE**

#### **LS Impact 3.6-a: Adverse Effect on Federally Protected Waters of the United States, Including Wetlands, As Defined by Section 404 of the CWA**

This alternative would involve repairs and improvements to the existing Feather River levee along Segment 2. No setback levee would be constructed. Repairs and improvements would consist of construction of slurry walls, installation of relief wells, raising and/or constructing seepage/stability berms at various locations, and correcting identified waterside erosion problem areas. Under this alternative, the existing Pump Station 3 would be removed and a new pump station would be installed farther east of the existing site; however, improvements to the channel between the existing levee and the Feather River would not occur. Soil borrow areas on the landside of the levee would be established of sufficient size to support levee repairs. It is anticipated that the erosion repair work on the existing Feather River levee would extend below the OHWM in areas where the OHWM is close to the toe of the levee at identified erosion sites (Figure 3.6-1a). Temporary disturbance to the Plumas Lake Canal would occur related to the relocation of Pump Station No. 3 and the decommissioning of the existing pump station. A total of 0.4 acre of waters of the U.S. would be affected from construction of a new pump station to replace Pump Station No. 3 (Table 3.6-2). The erosion repairs are estimated to affect approximately 3.6 acres of waters of the U.S., resulting in approximately 4.0 acres of total effect. These impacts to waters of the U.S. are considered a significant adverse effect.

No riparian habitat is located on the surface of the existing Feather River levee in the project area and no losses of riparian habitat are anticipated under the Levee Strengthening Alternative. However, small amounts of riparian vegetation (i.e., individual trees) in jurisdictional areas that potentially provide overhead cover for fish or contribute instream woody material to the Feather River channel may need to be removed or cleared from the waterside toe of the existing levee during the correction of identified erosion problem areas in project Segment 2.

### **3.6.2.5 NO-ACTION ALTERNATIVE**

Under the No-Action Alternative, it is possible that localized levee repairs (e.g., correction of identified waterside erosion sites) could be authorized under the federal Clean Water Act (CWA) Nationwide Permit (NWP) #3. However, under the No-Action Alternative, no other permissions would be granted by the Corps (e.g., CWA individual permit, Section 408 authorization) to alter the existing levee or discharge dredged or fill material into waters of the U.S. Existing jurisdictional habitat conditions would not be modified, and no construction activities that could temporarily or permanently affect jurisdictional waters of the U.S. would occur beyond what could be authorized under the CWA Nationwide Permit program. Under these conditions, only minor levee repairs could



be undertaken and heavy underseepage and loss of foundation soils would be expected to continue and the threat of another levee failure in the Segment 2 project area would remain.

If no action was taken to completely repair this deficient levee segment, another catastrophic levee failure would probably occur somewhere along the Segment 2 levee, and emergency cleanup and repair work and related earth moving activities following a levee breach would likely result in the disturbance or fill of waters of the U.S. The possibility for fill or disturbance of waters of the U.S., including wetlands, to occur following levee breach cannot be quantified.

### 3.6.3 MITIGATION

TRLIA is already legally committed to implementing mitigation measures from the Feather River Levee Repair Project (FRLRP) environmental impact report (EIR) that were determined to completely mitigate impacts to jurisdictional features and related habitats. Subsequent coordination with the Corps and the U.S. Fish and Wildlife Service (USFWS) through the CWA permitting process and the ESA Section 7 consultation process has led to a more detailed understanding of the mitigation approach. Compensatory mitigation to offset permanent impacts to waters of the U.S. would consist of a combination of on-site habitat restoration in the setback area and preservation of this habitat in perpetuity. This mitigation approach is more thoroughly described below under “Mitigation Measure 3.6-a: Complete Section 404 Permit Process and Mitigate for Wetland Acreage Affected on a ‘No-Net-Loss’ Basis.”

The Corps has the ultimate authority to approve the mitigation strategy described below as mitigation for the project’s anticipated effects to waters of the U.S. Consultation between the Corps and TRLIA on wetlands issues has included preparation of a conceptual mitigation plan, which has been accepted by the Corps as providing appropriate compensation for the project’s effects to waters of the U.S. The conceptual mitigation plan is part of Mitigation Measure 3.6-a (below). Fulfilling mitigation commitments described in the EIR, this EIS, and the conceptual mitigation plan associated with the 404 permit will fully compensate for impacts to jurisdictional features during project implementation.

The following mitigation measure would be applied to the **Applicant Preferred Alternative – ASB Setback Levee Alternative**. The same mitigation strategies would apply to the **Intermediate Setback Levee Alternative** and the **Levee Strengthening Alternative**.

#### **Mitigation Measure 3.6-a: Complete Section 404 Permit Process and Mitigate for Wetland Acreage Affected on a “No-Net-Loss” Basis**

TRLIA shall ensure completion of the Section 404 permitting process and shall implement measures to mitigate the acreage of affected jurisdictional wetland on a “no-net-loss” basis consistent with the requirements of the 404 permit. Based on the current approach outlined in the conceptual mitigation plan, the acreage of jurisdictional wetland affected shall be mitigated through habitat creation, restoration, rehabilitation, enhancement, and replacement on a “no-net-loss” basis. These activities will occur on the project site based on the strategy presented in the conceptual mitigation plan. Habitat restoration, rehabilitation, and/or replacement shall be at a location and by feasible methods agreeable to the Corps. TRLIA shall implement the feasible mitigation measures adopted through the permitting process, including those provided by the Corps as part of the 404 permit. Based on the mitigation approach outlined in the conceptual mitigation plan, a detailed compensatory mitigation plan will be prepared pursuant to Corps Guidelines and regulations at 33 CFR 332.4 (c)(2)-(c)(14) incorporating any recommendations received from the Corps.

It should be noted that continued planning and negotiations with state agencies having jurisdictional authority over aquatic resources in the project area have resulted in the creation of certain mitigation strategies to compensate for impacts to “waters of the state” that would also benefit waters of the U.S. Mitigation and compensation for impacts to waters of the state are addressed in the draft Section 401 Water Quality Certification

contained in Appendix B, “Sections 404 and 401 of the Clean Water Act, Permitting Documents.” Mitigation and compensation for impacts to riparian habitat are addressed in the executed streambed alteration agreement contained in Appendix G, “California Department of Fish and Game, Permit Applications.” Impacts to waters of the state and associated mitigation strategies converge to some degree with those that satisfy Corps requirements to mitigate for impacts to jurisdictional waters of the U.S. on a “no-net-loss” basis. This mitigation measure includes a requirement that applicable state mandated mitigation actions also be implemented.

### ***Conceptual Mitigation Plan***

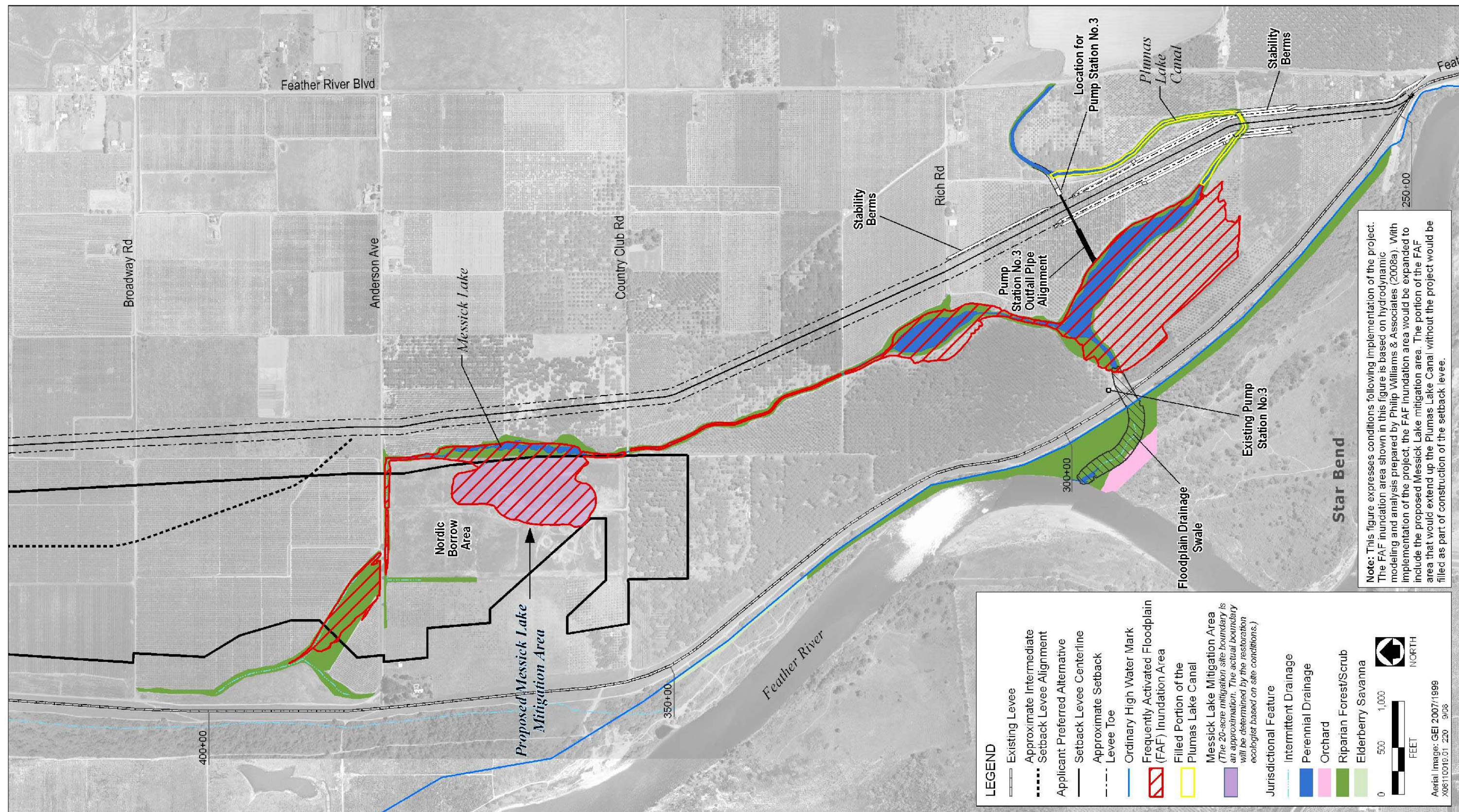
To offset the temporary and permanent impacts described above in accordance with Corps regulations set forth at 33 CFR Part 332, the applicant proposes a combined compensatory mitigation strategy with the goal of achieving no net loss of aquatic resource functions and services. This strategy is presented here in conceptual form. TRLIA is aware of the Corps’ mitigation requirements as set forth in 33 CFR Part 332 (hereinafter “Mitigation Rule”), and will coordinate extensively with Corps Regulatory Division staff to ensure those requirements are incorporated into a final mitigation and monitoring plan prepared in accordance with the Corps Sacramento District Mitigation and Monitoring Proposal Guidelines (Guidelines) and Mitigation Rule requirements.

Temporary impacts to waters of the U.S. associated with modifications to the floodplain drainage swale near the existing Pump Station No. 3 would provide an opportunity for the concurrent restoration and creation of 6.0 acres of open water habitat and adjacent riparian corridor. The applicant proposes to develop a planting plan for establishment of a 50-foot-wide corridor of riparian habitat along either side of the floodplain drainage swale between the Plumas Lake Canal and the Feather River. Long-term site protection would be accomplished through establishment of a restrictive covenant or other Corps approved legal instrument. TRLIA will coordinate closely with Corps Regulatory staff to develop the required easements and funding mechanisms for the mitigation areas described in this conceptual plan. Ownership of the mitigation areas would eventually be transferred to the State of California, most likely via the California Department of Water Resources, the California Department of Fish and Game, or both of these agencies. Long-term management of the mitigation areas remains to be resolved, but would most likely become the responsibility of a third party entity.

To offset the permanent loss of approximately 6.7 acres of waters of the U.S., the applicant is proposing the creation of approximately 20.1 acres of jurisdictional waters of the U.S. at the Nordic property borrow area adjacent to Messick Lake (Figure 3.6-3). Based on historical aerial photographs, Messick Lake historically extended west into the proposed mitigation area and is part of a larger lake complex connected to Plumas Lake to the south. Construction of the proposed floodplain drainage swale and removal of the existing levee after the proposed setback levee is complete would restore a hydrological connection between the Plumas Lake/Plumas Lake Canal/Messick Lake complex and the Feather River. The combined Nordic property and floodplain drainage swale mitigation efforts would restore important physical and ecological floodplain processes in the levee setback area and thereby improve overall geomorphic and ecologic functions in the watershed. The mitigation effort would thus further the goals of the recently published Mitigation Rule by “restoring an outstanding and regionally significant aquatic resource based on rigorous and scientific analysis.” Table 3.6-4 highlights the elements of this mitigation plan.

The applicant retained Philip Williams & Associates (PWA) to conduct a hydrological analysis of the levee setback area and identify areas that would be subject to a level of inundation sufficient to enhance and support physical and ecological floodplain processes. Studies prepared by PWA provide a basis for potential floodplain enhancement actions that would complement floodplain revegetation planning associated with the Feather River levee setback project (Philip Williams & Associates 2008a, 2008b). The PWA studies define a frequently activated floodplain (FAF) (also referred to as “floodplain activation flood”) as a floodplain with an elevation that receives active flooding for at least 7 consecutive days between March 15 and May 15 in 2 out of every 3 years. As described in the PWA studies, the FAF produces characteristic ecological benefits, and supports important aquatic resource functions such as food web productivity, water chemistry and quality, and spawning and rearing habitat for aquatic species.





Source: Based on Philip Williams & Associates 2008a

## Conceptual Mitigation Plan

Figure 3.6-3



| <b>Table 3.6-4</b><br><b>Highlights of Conceptual Mitigation Plan</b>                                                                                                                                                                               |                                                 |                                                                                                |                                                                                                                                                                           |                                                                                                                                                                                    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Construction Activity                                                                                                                                                                                                                               | Jurisdictional Waters Created by the Project    | Habitat Restoration Opportunity                                                                | Permanent Fill/Removal of Waters of the U.S.                                                                                                                              | Compensation for Permanent Fill/Removal of Waters of the U.S.                                                                                                                      |
| <ul style="list-style-type: none"> <li>Degradation of a small section of the existing levee to establish a connection between the Plumas Lake Canal and the floodplain drainage swale</li> <li>Creation of the floodplain drainage swale</li> </ul> | Net increase of 1.8 acres of open water habitat | Establish a riparian corridor along the floodplain drainage swale, 50 feet wide on either side | No permanent fill would occur as a result of these construction activities; temporary impacts to 4.2 acres of waters of the U.S. would result as described in Table 3.6-3 | Net increase of 1.8 acres of open water habitat; establishment of 50-foot-wide riparian corridor on either side of newly constructed drainage swale; in-perpetuity site protection |
| Construction of the setback levee                                                                                                                                                                                                                   |                                                 |                                                                                                | Fill/removal of portions of the Plumas Lake Canal, resulting in permanent impacts to a total of 6.7 acres of waters of the U.S.                                           | Create jurisdictional habitat on 20.1 acres within the setback levee borrow site to compensate for permanent effects to waters of the U.S.; in-perpetuity site protection          |

Based on hydrodynamic modeling, PWA estimated that FAF flows on the Feather River would inundate lands in the setback area at or below the 31.2-foot elevation. These areas are shown in Figure 3.6-3. It is anticipated that portions of the designated borrow area located in the Nordic property would be excavated to elevations below 31.2 feet during project construction. The applicant is proposing to develop the mitigation site in the excavated borrow area concurrent with degradation of the existing levee, and following construction of the new setback levee. Consequently, there would be a time lapse of up to 1 year between project impacts and project mitigation. The excavated borrow area would be partially backfilled with material from the degraded levee to reduce the potential for underseepage from open excavations waterside of the new levee. The mitigation area would be backfilled to an elevation of 30.5–31.2 feet (including any amended topsoil) to allow for inundation by backwater from the floodplain drainage swale at a frequency and duration that would support characteristic FAF ecosystem benefits. To develop the mitigation site, the surface soils would be evaluated by the restoration ecologist to determine whether the addition of organic material would be necessary to support vegetation establishment. If necessary, a surface layer of up to 18 inches of amended topsoil would be added. The site would be planted with a palette of native species developed by the project restoration ecologist and approved by the Corps.

The applicant proposes creation of 20.1 acres of mitigation habitat to offset the permanent loss of 6.7 acres of waters of the U.S. at a 3:1 ratio. Long-term site protection would be accomplished through establishment of a restrictive covenant or other Corps-approved legal instrument. A preliminary Property Analysis Record (PAR) analysis is being conducted to determine the cost of long-term management for the site. As discussed above, TRLIA would coordinate closely with the Corps to develop the required easements and funding mechanisms for the mitigation areas described in this conceptual plan.

## 3.7 TERRESTRIAL BIOLOGICAL RESOURCES

Terrestrial habitat types in the project area are characterized in this section; aquatic habitats are described in Section 3.8, “Fisheries.” The effects of the project on waters of the United States (U.S.), including wetlands, are separately addressed in Section 3.6, “Waters of the United States and Wetlands.” This section includes an analysis of the direct effects of the Applicant Preferred Alternative – Above Star Bend (ASB) Setback Levee Alternative (also referred to as the “Applicant Preferred Alternative”) and other alternatives on biological resources, including special-status species. Section 3.9, “Special Status Biological Resources,” reiterates the analysis of the project’s potential effects on special-status species. Indirect effects of the Applicant Preferred Alternative and other alternatives are addressed in Chapter 4.0, “Cumulative and Growth-Inducing Effects.” For example, for an evaluation of the effects of habitat loss resulting from development potentially facilitated by the Applicant Preferred Alternative and other action alternatives, see Section 4.1.2.6, “Biological Resources.” For an evaluation of the combined effects on terrestrial biological resources from implementation of past, present, and future projects in the region, see Section 4.2.4.5, “Terrestrial Biological Resources.”

### 3.7.1 EXISTING CONDITIONS

#### 3.7.1.1 HABITAT TYPES

The descriptions of habitat types and species presence are based on observations made during field surveys conducted in 2006, 2007, and 2008 and information previously presented in the Yuba-Feather Supplemental Flood Control Project (Y-FSFCP) programmatic environmental impact report (EIR) (Yuba County Water Agency 2003a) and the Feather River Levee Repair Project (FRLRP) EIR (TRLIA 2006b). Plant community classification is based primarily on *Preliminary Descriptions of the Terrestrial Natural Communities of California* (Holland 1986).

Biological resource surveys were conducted in 2007 and 2008 on potential borrow sites along the east side of the proposed setback levee north of Anderson Avenue and on a site located on Ella Road approximately 1 mile east of the north end of the setback levee alignment. No special-status species were observed within these sites.

Nine habitat types exist within the project site and vicinity: open water drainages, grazing land, developed land, fallow land, ruderal land, orchard, elderberry savanna, mixed riparian forest/scrub, and lacustrine. Each of these habitat types is described briefly below. The locations of these habitat types are shown in Figure 3.7-1, “Habitat Types and Elderberry Shrub Locations within the Study Area.” The habitats shown on Figure 3.7-1 include features that are considered waters of the U.S. or wetlands. Refer to Figure 3.6-1a and 3.6-1b, “Jurisdictional Waters of the United States within the Delineation Study Area,” which identifies jurisdictional features within the study area.

The term “study area” or “project study area” refers to the site of the Applicant Preferred Alternative – ASB Setback Levee Alternative (i.e., setback levee alignment, expanded Feather River floodway, borrow areas, Pump Station No. 3 relocation area, and other activity sites) and the immediate vicinity. The Applicant Preferred Alternative – ASB Setback Levee Alternative encompasses the largest land area among the action alternatives, and was therefore selected to represent the overall project study area.

#### Open-Water Drainages

The Feather River is a large, perennially flowing drainage in the project area that is generally open-water habitat lined with riparian forest and willow scrub.

Irrigation/drainage ditches serve to transport water to and from lands on both sides of the existing Feather River levee, including the proposed levee setback area in Segment 2. Some of these ditches are maintained regularly and therefore lack vegetation; others are more established canals that are well vegetated. These ditches and canals

convey water pumped from the river to orchards and fields of row crops on the land side of the Feather River levee and drain the area to Pump Station No. 3 that lifts stormwater and agricultural drainage water into the Feather River floodway. There are approximately 21.0 acres of open-water drainage habitat in the project study area.

### **Lacustrine**

Lacustrine habitats consist of the inundated open water portions of ponds and channels in the project area. These locations are typically inundated during all, or a large portion of the year. There are approximately 1.4 acres of lacustrine habitat in the project study area.

### **Mixed Riparian Forest/Scrub**

Riparian habitat in the project area includes Great Valley mixed riparian forest, Great Valley valley oak riparian forest, willow riparian scrub, and elderberry savanna (described separately below). There are approximately 106.0 acres of mixed riparian forest/scrub habitat in the project study area.

### **Riparian Forest**

Riparian forest occurs as a broad to narrow band of vegetation within the floodplains of the Feather River. Relatively thin corridors of riparian habitat are present along the Plumas Lake Canal and irrigation/drainage ditches in the proposed levee setback area. Riparian habitat is characterized by a complex structure, and the dominance of its component species varies along the river.

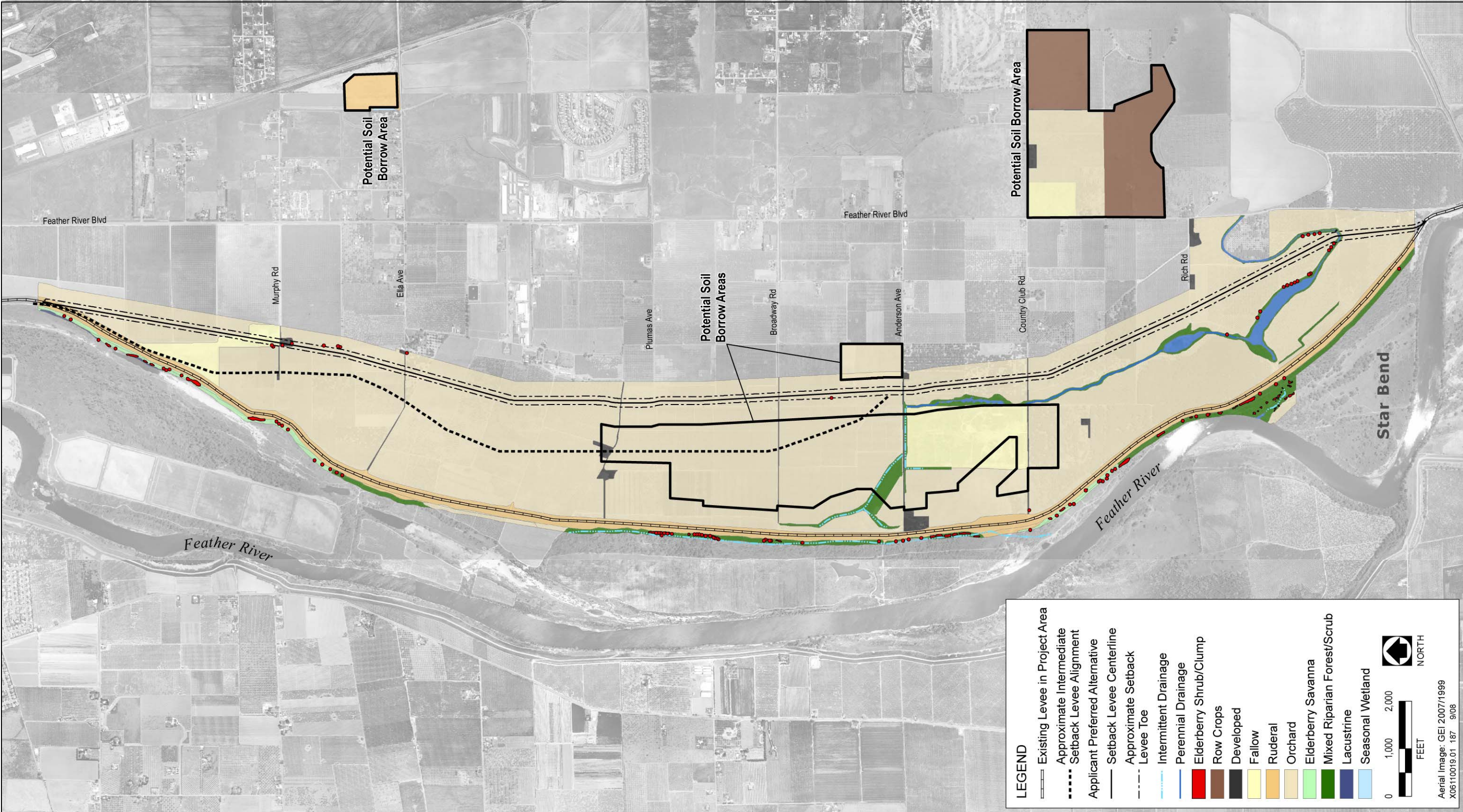
Great Valley mixed riparian forest is found within the Feather River floodway and, to a lesser extent, along the Plumas Lake Canal. This is a deciduous broadleaved forest community with a moderately dense to dense tree canopy that typically includes several species as codominants.

Within the project area the upper canopy of Great Valley mixed riparian forest is typically dominated by valley oak (*Quercus lobata*), Fremont cottonwood (*Populus fremontii*), boxelder (*Acer negundo*), Goodding's willow (*Salix gooddingii*), shining willow (*S. lucida* spp. *lasiandra*), red willow (*S. laevigata*), and Oregon ash (*Fraxinus latifolia*). White alder (*Alnus rhombifolia*), northern California black walnut (*Juglans californica* var. *hindsii*), and western sycamore (*Platanus racemosa*) may also exist in the upper canopy.

The lower shrub canopy is very dense and thicket-like. The dominant species are buttonbush (*Cephalanthus occidentalis*), California rose (*Rosa californica*), blue elderberry (*Sambucus mexicanus*), Himalayan blackberry (*Rubus discolor*), and shrub-like forms of the various willow species listed above. Lianas such as California grape (*Vitis californica*) and virgin's bower (*Clematis ligusticifolia*) are also found in the shrub layer. The herbaceous understory ranges from very developed to sparse depending on the amount of light filtering through the upper canopies, but typically includes various grasses, sedges, and rushes. The Great Valley mixed riparian forest along the water side of the existing Feather River levee is very dense and consists mostly of even-aged trees, with scattered, more established trees in some areas. A few mature valley oaks are apparent along the edge of the mixed riparian forest.

Great Valley valley oak riparian forest is generally found in the same areas as mixed riparian forest and is a deciduous broadleaved forest community with a closed to somewhat open canopy. This community type is similar to the Great Valley mixed riparian forest community described above but is clearly dominated by valley oak. The lower canopy includes scattered Oregon ash, Northern California black walnut, sycamore, and young valley oak. The sparse to dense shrub layer includes blue elderberry, California rose, coyote brush (*Baccharis pilularis*), and Pacific blackberry (*Rubus ursinus*). Climbing vines are apparent in openings but may also be found scattered in the shady understory. Common vine species are California pipevine (*Aristolochia californica*), virgin's bower, and California grape. A variety of grasses, sedges, and forbs such as creeping wild-rye (*Leymus triticoides*), mugwort (*Artemisia douglasiana*), and barbara sedge (*Carex barbarae*) exist in the dense to sparse understory.





Source: USFWS Biological Assessment, see Appendix H

Habitat Types and Elderberry Shrub Locations within the Study Area

Figure 3.7-1



## **Riparian Scrub**

Willow riparian scrub is a dense, shrub-dominated plant community that exists in patches along the Feather River and is also found along drainage/irrigation canals within the proposed levee setback area in Segment 2. Characteristic willow species in the project area are Goodding's willow, Arroyo willow (*Salix lasiolepis*), and red willow. Blue elderberry shrubs can also be frequently found. This community typically creates dense, impenetrable thickets, but remains fairly short in stature.

## **Elderberry Savanna**

Elderberry savanna is characterized by open stands of blue elderberry with an annual grassland understory. It occurs in project Segment 2 in areas along the Feather River corridor where disturbances have created large gaps in the dense canopies of the mixed and valley oak riparian communities. Also found in this community are scattered coyote brush, rose, Himalayan blackberry, and willow shrubs. Approximately 20.5 acres of elderberry savanna habitat are located in the project study area.

## **Ruderal Areas**

Ruderal areas are those that have been stripped of their native vegetative cover and that are either covered by gravel or dirt or dominated by weedy invasive species. Ruderal areas are common along the existing Feather River levee in project Segment 2 and in disturbed areas such as access roads. The levee slopes are generally dominated by nonnative grasses such as wild oats (*Avena fatua*); however, a few native species, including creeping wild rye (*Leymus triticoides*) and valley oak saplings, have become established in isolated areas on the levee slopes and at the levee toe. The vegetation on the levee slopes is maintained periodically through prescribed fire and/or mowing. An approximately 20-foot-wide corridor along the water side of the existing levee is routinely mowed and/or disked to keep woody riparian vegetation from becoming established. Conspicuous weeds in these ruderal areas are medusahead (*Taeniatherum caput-medusae*), woolly mullein (*Verbascum thapsus*), Canada thistle (*Cirsium arvense*), and yellow star-thistle (*Centaurea solstitialis*). A total of approximately 163 acres of ruderal habitat are located in the project study area.

## **Orchards**

Many of the areas on the land side of the existing Feather River levee are dominated by agricultural land. These agricultural areas consist mostly of orchards where fruit and nut crops are grown, as well as some agricultural facilities. Orchards are also maintained in the Feather River floodway in Segment 2, between the Feather River and the left bank levee. At various times, a small percentage of the agricultural land in the project vicinity is fallow or planted with field crops. Within the entire project study area, including soil borrow areas, the potential setback levee alignment, and land between the potential setback levee alignment and the Feather River, there are approximately 1,880 acres of orchards.

## **Row Crops**

Row crop lands are those planted with a variety of crops grown in long rows along a field. There is a broad range of food and feed crops grown in row crop configurations, including corn, other grains, beans, melons, tomatoes, and berries. Multiple types of crops can be grown in a field during the same year. Row crop lands in the project study area cover approximately 124.6 acres and are located in the potential soil borrow area east of Feather River Blvd. and south of Country Club Road (Figure 3.7-1).

## **Fallow Land**

Fallow lands are agricultural fields that were previously cultivated, harvested, and plowed, but have not been in agricultural production recently. These lands are characterized primarily by annual grasses and weedy forbs, but they may also include seedlings of some native tree and shrub species, such as willows and cottonwoods.

This community type differs from the ruderal classification in that it is not currently subject to ongoing disturbance and is used specifically to describe areas that were previously cultivated. Approximately 188.0 acres of fallow lands are located in the project study area.

## **Grazing Land**

Grazing lands identified in the project area consist of actively managed pastures used for cattle production. Vegetation is dominated by non-native grasses such as wild oats and weedy forbes; however, a limited amount of native grass species, such as creeping wild rye are present. Within the project area, grazing lands are limited to the potential soil borrow areas located east of the proposed setback levee alignment. During habitat surveys Grazing Land was not mapped as its own habitat type, but was identified as a land use on some lands mapped as fallow, ruderal, and row crop.

## **Developed Land**

Developed areas in the project vicinity generally consist of residential structures and other buildings, yards, roads, and parking areas. Developed areas are scattered on the land side of the existing Feather River levee. There are several scattered residential properties and other structures within the proposed levee setback area in project Segment 2. Many of the developed areas are devoid of vegetation, but where vegetation exists, it ranges from sparse cover of weedy species to horticultural plantings. Approximately 28.1 acres of developed lands are located in the project study area.

### **3.7.1.2 WILDLIFE**

The overall quality of wildlife habitat in the project vicinity is high, particularly in the southern portion of Segment 2. This is primarily because of the extensive corridor of riparian habitat within the existing Feather River floodway and riparian patches associated with the Plumas Lake Canal and other irrigation/drainage ditches within the proposed levee setback area in Segment 2. Riparian habitat within the existing Feather River floodway supports a high diversity of terrestrial wildlife species, including a wide range of breeding, migrant, and wintering birds, common reptiles and amphibians, and a variety of mammals.

The large areas of agricultural lands east of the Feather River levee support a lower diversity of wildlife, but can provide valuable habitat for large numbers of common bird, reptile, and mammal species. Field crops, fallow fields, and ruderal areas provide important foraging and nesting habitat for a variety of species. Irrigation/drainage ditches and the aquatic habitats they support provide habitat for amphibians, reptiles, and birds that may not occur elsewhere in the project area.

EDAW conducted surveys in 2006, 2007, and 2008 documenting a wide diversity of breeding birds, including seven species of raptors within the project area: Swainson's hawk (*Buteo swainsoni*), northern harrier (*Circus cyaneus*), Cooper's hawk (*Accipiter cooperii*), white-tailed kite (*Elanus leucurus*), red-shouldered hawk (*Buteo lineatus*), red-tailed hawk (*Buteo jamaicensis*), and great horned owl (*Bubo virginianus*). Mammals observed in the Feather River floodway and adjacent agricultural lands are mule deer (*Odocoileus hemionus*), bobcat (*Lynx rufus*), coyote (*Canis latrans*), black-tailed jackrabbit (*Lepus californicus*), and California ground squirrel (*Spermophilus beecheyii*). A variety of small mammals are also likely to occur and provide prey for the high numbers and diversity of breeding raptors.

### **3.7.1.3 SENSITIVE BIOLOGICAL RESOURCES**

Sensitive biological resources addressed below focus exclusively on special-status plant and wildlife species. Sensitive habitats, in the form of wetlands and waters of the U.S. afforded specific consideration through Section 404 of the CWA, are addressed separately in Section 3.6, "Waters of the United States and Wetlands."

The discussion and analysis of special-status species in this section is reiterated in Section 3.9, “Special-Status Biological Resources,” of this EIS.

### **Special-Status Species**

For the purposes of this analysis, special-status species are plants and animals that are legally protected or that are otherwise considered sensitive by federal conservation agencies, including:

- ▶ plant and wildlife species that are listed by the ESA as rare, threatened, or endangered;
- ▶ plant and wildlife species considered candidates for listing or proposed for listing under the ESA; and
- ▶ wildlife species identified by the U.S. Fish and Wildlife Service (USFWS) as species of concern

In addition, plant species considered rare, threatened, or endangered in the California Native Plant Society’s (CNPS’s) *Inventory of Rare and Endangered Vascular Plants of California* (California Native Plant Society 2006) are also considered in this EIS. CNPS is a scientific organization with special expertise in California. CNPS listed plant species are considered a corollary to wildlife species identified by the USFWS as species of concern.

The California Natural Diversity Database (CNDDDB) was used as the primary source to identify previously reported occurrences of special-status species in the project vicinity (California Natural Diversity Database 2007). Although the CNDDDB is the most current and reliable tool for tracking occurrences of special-status species, it contains only those records that have been reported to the California Department of Fish and Game (DFG). To identify additional special-status plant species with potential to occur in the project area, a search of the online edition of CNPS’s *Inventory of Rare and Endangered Vascular Plants of California* (California Native Plant Society 2006) was also conducted. Other sources include both published and unpublished data and reports and observations made during plant and wildlife surveys conducted for the FRLRP.

### **Special-Status Plant Species**

Two special-status plant species are documented in the CNDDDB and CNPS Inventory as occurring in the project vicinity: Rose mallow (*Hibiscus lasiocarpus*) and Wright’s trichocoronis (*Trichocoronis wrightii* var. *wrightii*). Information regarding these species is provided in Table 3.7-1. Other species recorded in the region are not expected to occur at the project site because they are restricted to habitats that are not present in the project area, such as vernal pools, meadows, grasslands, and cismontane woodlands.

Rose mallow is a CNPS List 2 plant (plants considered rare, threatened, or endangered in California but more common elsewhere). It is an emergent perennial herb in the mallow family that produces large pink flowers. It blooms from June to September and grows in freshwater marshes and swamps. Suitable habitat for rose mallow exists in the proposed levee setback area in Segment 2 and includes areas of freshwater marsh within drainage/irrigation canals and ditches. Approximately 10–20 acres of suitable habitat occurs in the project study area.

Wright’s trichocoronis is also a CNPS List 2 plant. An annual herb in the sunflower family, it produces small whitish flowers from May to September and grows in meadows, marshes and swamps, riparian forest, and vernal pools. Suitable habitat for Wright’s trichocoronis is provided by freshwater marsh in the drainage/irrigation canals and ditches in the proposed levee setback area in Segment 2, in moist riparian habitats bordering drainage/irrigation canals and ditches, and within the Feather River floodway. Approximately 50–60 acres of suitable habitat occurs in the project study area.

In July 2007, EDAW botanists conducted a rare plant survey targeting potential occurrences of rose mallow and Wright’s trichocoronis that could be disturbed as a result of project implementation. In summary, no populations of these special-status species were identified during the survey. Therefore, although suitable habitat for these species occurs at the project site, they are not expected to occur and are not addressed further.

| <b>Table 3.7-1</b><br><b>Special-Status Plant Species with Potential to Occur in the Project Vicinity</b> |                      |                                                                                             |                                                                                                                                                    |                  |                                                                                                                                                |
|-----------------------------------------------------------------------------------------------------------|----------------------|---------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| Species                                                                                                   | Listing Status USFWS | Habitat                                                                                     | Distribution                                                                                                                                       | Flowering Period | Potential for Occurrence in the Project Study Area                                                                                             |
| Rose mallow<br><i>Hibiscus lasiocarpus</i>                                                                | -                    | Marshes and swamps (freshwater); 0–120 meters elevation                                     | Butte, Contra Costa, Colusa, Glenn, Sacramento, San Joaquin, Solano, Sutter, and Yolo Counties, widespread outside of California                   | June–September   | Approximately 10–20 acres of suitable habitat in the project study area., but species not found during focused surveys. Not expected to occur. |
| Wright’s trichocoronis<br><i>Trichocoronis wrightii</i><br>var. <i>wrightii</i>                           | -                    | Meadows, marshes and swamps, riparian forest, vernal pools/alkaline; 5–435 meters elevation | Extant in Merced and Riverside Counties and in Texas, and widespread outside of California; extirpated in Colusa, San Joaquin, and Sutter Counties | May–September    | Approximately 50–60 acres of suitable habitat in the project study area., but species not found during focused surveys. Not expected to occur. |

### **Special-Status Wildlife Species**

Based on previously existing information and observations made during field surveys, a total of seven special-status wildlife species have potential to occur in the project vicinity. The regulatory status, habitat associations, and potential for these species to occur in the project area are summarized in Table 3.7-2. Additional special-status animal species are known to occur in the region. However, based on the field surveys and assessment of database records, these species are not expected to occur at the project site and were eliminated from further analysis because no suitable habitat occurs in the project area, the species have not been documented in the project vicinity despite numerous biological surveys, and/or the species have very restricted ranges that do not include the project study area.

Two of the special-status wildlife species with potential to occur in the project area are federally listed as threatened: valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) and giant garter snake (*Thamnophis gigas*). Western yellow-billed cuckoo (*Coccyzus americanus occidentalis*) is a candidate for listing under the ESA. The remaining species are considered species of concern by USFWS. These species are discussed further below.

The valley elderberry longhorn beetle is federally listed as threatened. This beetle is generally found in riparian habitats and requires blue elderberry shrubs for survival and reproduction. Valley elderberry longhorn beetle has been documented at the Bobelaine Audubon Sanctuary, located on the west (Sutter County) side of the Feather River, 12 miles south of Yuba City (California Natural Diversity Database 2007). Field surveys conducted for the project in 2007 resulted in identification of elderberry shrubs in the Segment 2 project area, which are depicted in Figure 3.7-1. Over 150 elderberry shrubs or shrub clumps have been mapped in the project area. All elderberry shrubs with stems 1 inch or greater in diameter within the range of the valley elderberry longhorn beetle are considered potential habitat for this threatened species.

**Table 3.7-2  
Special-Status Wildlife Species with Potential to Occur in the Project Vicinity**

| Species                                                                                                                                                                         | <u>Listing Status</u><br>USFWS | Habitat                                                                                                                                                                    | Potential for Occurrence<br>on the Project Site                                                                                                                                                                                                                                                                                                                                  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Valley elderberry<br>longhorn beetle<br><i>Desmocerus californicus<br/>dimorphus</i>                                                                                            | T                              | Elderberry shrubs,<br>typically within riparian<br>habitat.                                                                                                                | May occur on-site. Valley elderberry longhorn<br>beetles have been documented in the project vicinity<br>(California Natural Diversity Database 2007).<br>Elderberry shrubs grow in the Feather River<br>floodway and in the proposed levee setback area in<br>project Segment 2. Approximately 135 total shrubs<br>in the project study area.                                   |
| Northwestern pond turtle<br><i>Emys marmorata<br/>marmorata</i>                                                                                                                 | FSC                            | Requires some slack- or<br>slow-water aquatic<br>habitat; prefers habitats<br>with prevalence of<br>basking sites.                                                         | Pond turtles are known to occur in the project<br>vicinity (California Natural Diversity Database<br>2007). Suitable habitat is available in the Feather<br>River floodway and in irrigation/drainage ditches<br>and canals in the proposed levee setback area in<br>project Segment 2. Approximately 15–20 total acres<br>of potential habitat occur in the project study area. |
| Giant garter snake<br><i>Thamnophis gigas</i>                                                                                                                                   | T                              | Open water associated<br>with marshes, sloughs,<br>and irrigation/drainage<br>ditches within the Central<br>Valley; requires<br>developed wetland<br>vegetation for cover. | Low potential but possible within the Plumas Lake<br>Canal and other irrigation/drainage ditches in the<br>proposed levee setback area in Segment 2.<br>Approximately 16.9 acres of suitable aquatic habitat<br>and 11 acres of suitable upland habitat occur in the<br>project study area.                                                                                      |
| Western yellow-billed<br>cuckoo<br><i>Coccyzus americanus<br/>occidentalis</i>                                                                                                  | C                              | Generally occurs in dense<br>riparian habitats.                                                                                                                            | May nest within the Feather River floodway.<br>However, no potential habitat to be affected by<br>project activities.                                                                                                                                                                                                                                                            |
| Loggerhead shrike<br><i>Lanius ludovicianus</i>                                                                                                                                 | FSC                            | Forages in grasslands and<br>agricultural fields; nests in<br>scattered shrubs and trees.                                                                                  | May nest in trees and shrubs in the proposed levee<br>setback area, and in the Feather River floodway.<br>Approximately 76.0 acres of potential nesting<br>habitat occurs in the project study area. Suitable<br>foraging habitat present throughout the project study<br>area.                                                                                                  |
| Tricolored blackbird<br><i>Agelaius tricolor</i>                                                                                                                                | FSC                            | Forages in grasslands and<br>agricultural fields; nests in<br>freshwater marsh with<br>dense cattails and tules,<br>riparian scrub, and other<br>dense shrubs and herbs.   | Potential nesting habitat is of marginal quality;<br>however, could nest in riparian scrub and freshwater<br>marsh within the Feather River floodway and<br>proposed levee setback areas in Segment 2.<br>Approximately 76.0 acres of potential nesting<br>habitat occurs in the project study area. Suitable<br>foraging habitat present throughout the project study<br>area.  |
| Pacific western big-eared<br>bat<br><i>Corynorhinus townsendii<br/>townsendii</i>                                                                                               | FSC                            | Hibernates in caves,<br>mines, and on old<br>buildings. May roost at<br>night in tree cavities.<br>Forages in a variety of<br>upland habitats.                             | May roost in snags in the riparian woodland within<br>the Feather River floodway. Due to specific micro-<br>habitat requirements, acreage of roosting habitat<br>cannot be estimated. Suitable foraging habitat<br>present throughout the project study area.                                                                                                                    |
| U.S. Fish and Wildlife Service (USFWS) Federal Listing Categories:<br>T      Federally listed as threatened<br>C      Candidate for listing<br>FSC   Federal Species of Concern |                                |                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                  |

The northwestern pond turtle is a federal Species of Concern. The northwestern pond turtle has been documented along the Feather River in the Bobelaine Audubon Sanctuary. Suitable basking and nesting habitat for this species exists within portions of the Feather River floodway. Approximately 15–20 acres of potential habitat for northwestern pond turtle occurs in the project area.

Giant garter snake is federally listed as threatened. Giant garter snakes inhabit a variety of aquatic habitats, such as agricultural canals, marshes, sloughs, and ponds. Giant garter snakes also require adjacent upland habitat (for basking) and burrows (for over wintering) that provide sufficient cover and are at high enough elevations to function as refuges from floodwaters during the snakes' inactive season (early fall to early spring). A historical population was documented in the project region, east of State Route (SR) 70 near the Bear River approximately 3 miles upstream of the confluence with the Feather River. Despite the lack of recent records of giant garter snake in the project vicinity, aquatic habitats in the area could support giant garter snakes because they are hydrologically connected to areas capable of supporting the species. The rice fields and accompanying irrigation system, which existed prior to the extensive residential development west of SR 70 and north of Feather River Boulevard, provided habitat and transit corridors for giant garter snakes that may have occupied the region historically. The Plumas Lake Canal is a historical feature capable of sustaining giant garter snakes, and it may support remnant populations of the species. Most upland habitat in the project vicinity is dominated by agricultural lands; these areas are incompatible with the biological needs of giant garter snake because routine maintenance eliminates belowground refuge. Therefore, undisturbed uplands and potential over wintering habitat is limited to bank margins of the aquatic habitat. Field surveys conducted for the project in 2007 included mapping of suitable aquatic and upland habitats. Approximately 16.9 acres of suitable aquatic habitat and 11 acres of suitable upland habitat occur in the project area.

Tricolored blackbird (*Agelaius tricolor*) is a federal Species of Concern. Tricolored blackbirds nest colonially and prefer dense cattail patches, but they also utilize blackberry and other patches of dense vegetation. They forage in grasslands and agricultural fields. The nearest tricolored blackbird colonies documented during statewide surveys conducted in 2005 were at Beale Air Force Base, approximately 10 miles east of the project area (USFWS data). There are no records of historic colonies within approximately 2 miles of the project area (California Natural Diversity Database 2007). Despite the lack of known nearby colonies, freshwater marsh and riparian scrub habitats within the project study area could support a nesting colony in the future. Approximately 76.0 acres of potential nesting habitat occurs in the project study area. In addition, small flocks of tricolored blackbirds were observed flying over the project area during 2006 surveys and could forage in agricultural fields and other open habitats in the study area.

Western yellow-billed cuckoo is a candidate for federal listing as threatened or endangered. This species requires relatively large wide patches of cottonwood-willow riparian forests. Potentially suitable habitat for yellow-billed cuckoo exists within the Feather River floodway in the southern portion of Segment 2. However, none of the suitable habitat in the floodway would be directly affected by the Applicant Preferred Alternative or other alternatives. Western yellow-billed cuckoo has been documented at the Bobelaine Audubon Sanctuary and in the vicinity of the confluence of the Feather and Yuba Rivers (California Natural Diversity Database 2007).

Loggerhead shrike (*Lanius ludovicianus*) is a federal Species of Concern. Shrikes inhabit lowland and foothill areas with scattered shrubs and trees. Loggerhead shrikes nest in shrubs and small trees and typically forage in grasslands and agricultural fields. Approximately 76.0 acres of potential nesting habitat occurs in the project study area. Suitable foraging habitat exists throughout the project area.

Pacific western big-eared bat (*Corynorhinus townsendii townsendii*) is a federal Species of Concern. This species generally hibernates in caves, mines, or old buildings but may roost in tree cavities. There are no natural and very few potential artificial roosting locations in the project area on the land side of the existing levees. However, snags in the riparian woodland in the Feather River floodway could provide roosting habitat for small numbers of individuals. There are no CNDDDB records of past colonies in or near the project area. Given the limited micro-

habitat types used by this species for roosting, a specific acreage of suitable roosting habitat in the project area cannot be calculated. Suitable foraging habitat is present throughout the project study area.

## **3.7.2 ENVIRONMENTAL CONSEQUENCES**

### **3.7.2.1 SIGNIFICANCE CRITERIA**

A project alternative would have a significant impact on biological resources if it would:

- ▶ have a substantial adverse effect, either directly or through habitat modifications, on any special-status species;
- ▶ interfere substantially with the movement of any native resident or migratory wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- ▶ conflict with the provisions of an adopted habitat conservation plan, natural community conservation plan, or other approved local, regional, or state habitat conservation plan; or
- ▶ substantially reduce the habitat of a wildlife species, violate a federal regulation intended to prevent substantial population reductions of a wildlife species such as the Migratory Bird Treaty Act, cause a wildlife species to drop below self-sustaining levels, threaten to eliminate a plant or animal community, or reduce the number or restrict the range of an endangered, rare, or threatened species.

No habitat conservation or natural community conservation plans are in effect that would apply to the project area. Therefore, impacts that might relate to this significance criterion are not considered.

The following analysis addresses direct effects of the Applicant Preferred Alternative – ASB Setback Levee Alternative and other alternatives. Potential indirect effects of the Applicant Preferred Alternative and other alternatives are addressed in Chapter 4.0, “Cumulative and Growth-Inducing Effects.” For example, for an evaluation of the effects of habitat loss resulting from development potentially facilitated by the Applicant Preferred Alternative and other action alternatives, see Section 4.1.2.6, “Biological Resources.” For an evaluation of the combined effects on terrestrial biological resources from implementation of past, present, and future projects in the region see Section 4.2.4.5, “Terrestrial Biological Resources.”

### **3.7.2.2 APPLICANT PREFERRED ALTERNATIVE – ASB SETBACK LEVEE ALTERNATIVE**

#### **AP Impact 3.7-a: Adverse Effects on Special-Status Wildlife Species**

Effects on special-status species from the Applicant Preferred Alternative – ASB Setback Levee Alternative and other alternatives are summarized in Table 3.7-3. Impacts in Table 3.7-3 are expressed in terms of acres of potential habitat disturbed/removed under each alternative; except in the case of valley elderberry longhorn beetle, where impacts are expressed in terms of elderberry shrubs affected. Acreages of impact are not provided for western yellow-billed cuckoo and Pacific western big-eared bats either because habitat for the species would not be affected by the project (i.e., western yellow-billed cuckoo), or micro-habitat requirements for the species do not allow acres of potential habitat to be reasonably quantified (i.e., Pacific western-big eared bat).

Valley elderberry longhorn beetles have been documented as recently as 2002 at the Bobelaine Audubon Sanctuary, on the west (Sutter County) side of the Feather River (California Natural Diversity Database 2007). Blue elderberry shrubs, the host plant for valley elderberry longhorn beetle larvae, are found throughout riparian habitat along much of the Feather River floodway. Shrubs grow along the edge of the riparian corridor, immediately adjacent to the existing levees and along various drainages and waterways east of the existing levee. Detailed mapping of elderberry shrubs has been conducted (Figure 3.7-1), as well as counts of individual stems



1 inch or greater in diameter. A total of 58 elderberry shrubs may require removal during implementation of the Applicant Preferred Alternative – ASB Setback Levee Alternative. Of the 58 elderberry shrubs that may require removal, 24 showed evidence of valley elderberry longhorn beetle exit holes in one or more stems. This information has been provided to the USFWS as part of the ESA Section 7 consultation, which was completed with issuance of the final Biological Opinion (BO) on August 28, 2008. Details on locations of elderberry shrubs that would be affected by construction are documented in the “Biological Assessment and Additional Information, Segment 2,” that is contained in Appendix H, “Correspondence Regarding Special-Status Species.” The final Biological Opinion (BO) is also attached to this EIS in Appendix H. Removal of these shrubs without appropriate compensation would be a significant adverse effect. Based on consultation with USFWS, TRLIA has committed to establishing a permanent conservation easement within the setback area to compensate for elderberry shrubs that are expected to be moved out of the project construction area. Approximately 40 acres would be retained to accommodate transplanted shrubs, seedlings, and associated riparian species, in accordance with USFWS *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (USFWS 1999). The conservation easement would be established in perpetuity. Through transplanting of existing shrubs and additional elderberry plantings in the mitigation area there would ultimately be a net gain in habitat for valley elderberry longhorn beetle after project implementation. Elderberry shrubs are tolerant of, and often favor, periodic inundation, as evidenced by the fact that the highest densities of elderberry shrubs in the project vicinity occur on the water side of the existing Feather River levee. Therefore, periodic flooding of the setback area after removal of the existing levee would not have an adverse effect on elderberry shrubs currently located in the setback area or the valley elderberry longhorn beetle.

The northwestern pond turtle has been documented along the Feather River in Bobelaine Audubon Sanctuary, and suitable aquatic habitat for the species is provided in irrigation/drainage canals with the project area, including the Plumas Lake Canal. Construction of the setback levee and activities associated with the relocation of Pump Station No. 3 could result in disturbance and/or removal of approximately 2 acres of suitable aquatic habitat for northwestern pond turtle, and direct mortality of turtles, if any are present in the affected areas. This would be a significant adverse effect. Given that northwestern pond turtles are known to occur in the Feather River channel, removal of the existing levee and subsequent periodic inundation of the setback area would not have an adverse effect on pond turtles that may occur in drainage canals retained in the setback area.

Irrigation/drainage canals and ditches and adjacent uplands east of the existing Feather River levee provide potentially suitable habitat for giant garter snake. Construction of the proposed setback levee would result in fill of small portions of aquatic habitat within the setback levee footprint. Borrow excavation in the setback area could result in impacts on upland habitat for giant garter snake in areas adjacent to suitable aquatic habitat. Construction activities could also result in direct take of giant garter snake, particularly during the snake’s inactive season (October through April). After removal of the existing levee, the levee setback area would become part of the Feather River floodway and would be inundated for multiple continuous days during each flood event. If giant garter snakes are present within the setback area, inundation would displace wintering individuals from their burrows and could result in mortality. The removal of giant garter snake habitat during project construction and the loss of habitat due to exposure of lands within the setback area to periodic flooding are considered significant adverse effects. Based on consultation with USFWS and in accordance with the BO (Appendix H), TRLIA plans to purchase mitigation credits at a ratio of 3:1 upland habitat to aquatic habitat. Based on the estimated acreage of impacted habitat (16.1 acres of aquatic habitat and 10.6 acres of upland habitat), TRLIA plans to acquire 49 acres of aquatic habitat and 32 acres of upland habitat at the Wildlands, Inc., Gilsizer Slough South Giant Garter Snake Conservation Bank, which is an approved conservation bank in Sutter County.

No potential habitat for loggerhead shrike and tricolored blackbird that occurs in the existing Feather River channel (water side of the existing levee) would be affected by the Applicant Preferred Alternative. Riparian habitats within the levee setback area could be suitable for loggerhead shrike and tricolored blackbird. Although approximately 8.5 total acres of potential loggerhead shrike and tricolored blackbird nesting habitat could be directly affected by implementation of the Applicant Preferred Alternative – ASB Setback Levee Alternative, effects would be spread across small pockets of habitat that are of relatively low quality in comparison to less

disturbed and more contiguous habitat closer to the main channel of the Feather River. Potential foraging habitat occurs throughout the project study area and large quantities of foraging habitat would remain available both during and after project construction. Ample habitat is available for these species in the existing Feather River floodway and potential impacts to these species associated with the Applicant Preferred Alternative would be minimal. Any adverse effects that might occur for loggerhead shrike and tricolored blackbird are not considered significant.

Pacific western big-eared bats could forage in the project area, including in the vicinity of the existing Feather River levee and the proposed setback levee. Potential foraging habitat occurs throughout the project study area and large quantities of foraging habitat would remain available both during and after project construction. Trees in and near the project area could provide roost sites for a small number of bats, but the project area does not provide roosting habitat capable of supporting large numbers of individuals or maternity roosts. Because no important bat roost sites or maternity sites are anticipated to exist in the project area, potential effects on Pacific western big-eared bats from implementation would be minimal. Any adverse effects that might occur for Pacific western big-eared bats are not considered significant.

**Table 3.7-3  
Impacts to Special-Status Wildlife Species Resulting from Project Alternatives**

| Species                                                        | Alternative                                                                               |                                                                                           |                                                       |                                                                                                                                                                  |
|----------------------------------------------------------------|-------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|-------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                | Applicant Preferred Alternative – ASB Setback Levee Alternative                           | Intermediate Setback Levee Alternative                                                    | Levee Strengthening Alternative                       | No-Action Alternative                                                                                                                                            |
| Valley elderberry longhorn beetle (elderberry shrubs affected) | 58 elderberry shrubs to be removed and transplanted                                       | 53 elderberry shrubs to be removed and transplanted                                       | No elderberry shrubs requiring removal/transplanting  | No elderberry shrubs requiring removal/transplanting                                                                                                             |
| Giant garter snake                                             | 16.1 acres of aquatic habitat and 10.6 acres of upland habitat removed or made unsuitable | 16.1 acres of aquatic habitat and 10.6 acres of upland habitat removed or made unsuitable | Less than 1 acre of suitable aquatic habitat affected | No suitable aquatic or upland habitat to be directly affected; however, mortality to giant garter snakes could occur as a result of flooding from a levee breach |
| Northwestern pond turtle                                       | Approximately 2 acres of suitable aquatic habitat removed/disturbed                       | Approximately 2 acres of suitable aquatic habitat removed/disturbed                       | Less than 1 acre of suitable aquatic habitat affected | No suitable aquatic habitat to be affected                                                                                                                       |
| Loggerhead shrike                                              | 8.5 acres potential nesting habitat removed/disturbed                                     | 8.5 acres potential nesting habitat removed/disturbed                                     | No potential nesting habitat affected                 | No potential nesting habitat affected                                                                                                                            |
| Tricolored blackbird                                           | 8.5 acres potential nesting habitat removed/disturbed                                     | 8.5 acres potential nesting habitat removed/disturbed                                     | No potential nesting habitat affected                 | No potential nesting habitat affected                                                                                                                            |

### **AP Impact 3.7-b: Adverse Effects on Nesting Raptors and Other Nesting Migratory Bird Species Protected Under the Migratory Bird Treaty Act**

The project area provides suitable nesting and foraging habitat for Swainson's hawk and other raptor species. Raptors and other tree-nesting migratory bird species are known to nest in riparian habitat along the Feather River and in riparian and other patches of nonorchard trees on the landside levee. Ground-nesting and burrowing migratory bird species, such as northern harriers and burrowing owls, could nest in agricultural fields and ruderal and fallow areas adjacent to the levee and in the potential borrow sites in the levee setback area. Construction activities associated with the Applicant Preferred Alternative could result in disturbance of raptors nesting nearby, potentially resulting in nest abandonment and loss of active nests. Removal of nests, nest abandonment, or mortality to eggs or chicks resulting from nest abandonment would all be considered violations of the Migratory Bird Treaty Act (MBTA).

Following project construction, the conversion of orchards within the levee setback area could result in an overall increase in foraging habitat for special-status and common raptors. This would be a beneficial effect.

Preconstruction surveys to identify active raptor nests in the FRLRP project area began in February 2008. These ongoing surveys and related monitoring activities will continue in the Segment 2 construction areas throughout the 2008 breeding season and subsequent breeding seasons until young have fledged.

Project construction could potentially cause nest abandonment and loss of active nests if nesting raptors are present; therefore, this impact is considered significant.

#### **3.7.2.3 INTERMEDIATE SETBACK LEVEE ALTERNATIVE**

### **ISL Impact 3.7-a: Adverse Effects on Special-Status Wildlife Species**

Except for the setback levee alignment shift in the northern portion of the Intermediate Setback Levee Alternative's alignment, the construction of the Intermediate Setback Levee Alternative would be very similar to the Applicant Preferred Alternative – ASB Setback Levee Alternative, including use of borrow areas, relocation of Pump Station No. 3, enlargement of the drainage channel near the existing Pump Station No. 3, and removal of the existing levee. Therefore, disturbance of habitat and potential take of special-status species resulting from the Intermediate Setback Levee Alternative would be comparable to the Applicant Preferred Alternative. Significant adverse effects would occur related to valley elderberry longhorn beetle (53 shrubs removed and relocated), northwestern pond turtle (2 acres of potential habitat removed/disturbed), and giant garter snake (16.1 acres of aquatic habitat and 10.6 acres of upland habitat removed or made unsuitable). TRLIA would commit to establishing a permanent conservation easement within the setback area to compensate for elderberry shrubs that would be moved out of the project construction area. Both the Applicant Preferred Alternative and the Intermediate Setback Levee Alternative result in inundation of similar amounts of potential giant garter snake habitat in the respective setback areas, and TRLIA would purchase mitigation credits at a ratio of 3:1 upland habitat to aquatic habitat to compensate for potential impacts to giant garter snake.

### **ISL Impact 3.7-b: Adverse Effects on Nesting Raptors and Other Nesting Migratory Bird Species Protected Under the Migratory Bird Treaty Act**

Under the Intermediate Setback Levee Alternative, potential effects to raptors and other tree-nesting migratory bird species would be very similar to those described for the Applicant Preferred Alternative – ASB Setback Levee Alternative. There is similar potential for construction activities to disturb raptors and other migratory bird species nesting in the project vicinity and similar potential for ground-nesting and burrowing migratory bird species to be disturbed during the breeding season. Removal of nests, nest abandonment, or mortality to eggs or chicks resulting from nest abandonment would all be considered violations of the MBTA.

As described above, preconstruction surveys to identify active raptor nests in the FRLRP project area began in February 2008. These ongoing surveys and related monitoring activities will continue in the Segment 2 construction areas throughout the breeding season until the young have fledged during each year of construction.

Because project construction could potentially cause the loss of an active nest if nesting raptors are present, this impact is considered significant.

#### **3.7.2.4 LEVEE STRENGTHENING ALTERNATIVE**

##### **LS Impact 3.7-a: Adverse Effects on Special-Status Wildlife Species**

The Levee Strengthening Alternative would not require removal of elderberry shrubs located within the setback alignment or within the channel between the existing levee and the Feather River. Furthermore, because the Levee Strengthening Alternative would not alter the location of the existing levee to create an expanded floodway on land that is currently behind the existing levee, this alternative would not allow seasonal inundation of any sensitive habitats not currently experiencing winter flooding. Therefore, the Levee Strengthening Alternative would not result in potential alteration to giant garter snake habitat or take of individual snakes as a result of seasonal flooding. Temporary disturbance to the Plumas Lake Canal related to the decommissioning of the existing Pump Station No. 3 and loss of aquatic habitat associated with construction of a new Pump Station No. 3, would affect less than 1 acre of potential habitat for northwestern pond turtle and giant garter snake. Although the area of affected potential habitat is small, this would still be considered a significant adverse effect. Like the setback levee alternatives described above, the Levee Strengthening Alternative would not result in significant adverse effects related to loggerhead shrike, tricolored blackbird, or Pacific western big-eared bat.

##### **LS Impact 3.7-b: Adverse Effects on Nesting Raptors and Other Nesting Migratory Bird Species Protected Under the Migratory Bird Treaty Act**

The Levee Strengthening Alternative would require far less disturbance of land than under the Applicant Preferred Alternative – ASB Setback Levee Alternative or the Intermediate Setback Levee Alternative. The construction corridor would be focused along the existing levee. The requirement for borrow material under this alternative would result in disturbance of smaller areas to obtain the necessary quantities of material. Although fewer total months of construction would be required for this alternative, the construction period would generally overlap with the breeding seasons for the bird species in question. Therefore, construction disturbance could result in the removal or abandonment of a nest, and mortality to eggs and chicks if nest abandonment were to occur. Removal of nests, nest abandonment, or mortality to eggs or chicks resulting from nest abandonment would all be considered violations of the MBTA and a significant adverse effect.

Preconstruction surveys to identify active raptor nest in the FRLRP project area began in February 2008. These ongoing surveys and related monitoring activities will continue in the Segment 2 construction areas throughout the breeding season until the young have fledged each construction year. However, because project construction could potentially cause the loss of an active nest if nesting raptors are present, this impact is considered significant.

#### **3.7.2.5 NO-ACTION ALTERNATIVE**

If no permissions were granted to alter the existing levee or discharge dredged or fill material into waters of the United States, existing habitat conditions would not be modified, and no construction activities that could directly or indirectly affect vegetation or wildlife would occur, other than those that might be associated with the continuation of existing levee inspection and maintenance requirements. Under these conditions, heavy underseepage and loss of foundation soils would be expected to continue and the threat of another levee failure in the Segment 2 project area would remain. Under the No-Action Alternative, it is possible that localized levee repairs (e.g., correction of identified waterside erosion sites) could be authorized under the federal Clean Water

Act (CWA) Nationwide Permit (NWP) #3. This work would be unlikely to result in significant impacts to protected species.

If no action was taken to completely repair this deficient levee segment, a levee failure could inundate areas that may currently provide upland habitat where giant garter snakes hibernate through the flood season. If giant garter snakes were present in these areas, flooding would likely result in direct mortality to this species. Emergency levee repair work, clean-up and reconstruction after a flood event, and other activities in response to a levee breach could also result in the disturbance of special-status species and their habitats.

### 3.7.3 MITIGATION

The following mitigation measure would be applied to the **Applicant Preferred Alternative – ASB Setback Levee Alternative and the Intermediate Setback Levee Alternative**.

#### **Mitigation Measure 3.7-a1: Minimize Adverse Effects on Valley Elderberry Longhorn Beetle**

TRLIA and its primary contractors for engineering design and construction shall ensure that the following measures are implemented to minimize and compensate for potential project effects on valley elderberry longhorn beetles. TRLIA has already committed to implementing these measures through the California Environmental Quality Act (CEQA) EIR process. These measures also repeat and/or support mitigation requirements identified in the USFWS BA and final BO. Additional mitigation measures provided by USFWS as part of the final BO shall also be implemented. As discussed above, approximately 40 acres would be held under a conservation easement within the levee setback area to accommodate transplanted elderberry shrubs, seedlings, and associated riparian species, in accordance with USFWS guidelines. The conservation easement would be established in perpetuity.

1. A worker awareness training program for construction personnel will be conducted by a qualified biologist prior to beginning construction activities. The program will inform all construction personnel about the life history and status of the beetle, requirements to avoid damaging the elderberry plants, and the possible penalties for not complying with these requirements. Written documentation of the training will be submitted to USFWS within 30 days of its completion.
2. Pre-construction and post-construction surveys will be done of the elderberry shrubs in the project area. The post-construction survey will confirm that there was no additional damage to any of the elderberry shrubs than as described in this EIS and the BO.
3. All areas to be avoided during construction activities will be fenced and flagged. In most cases, fencing will be placed at least 20 feet from the dripline of the shrub. In some cases, construction activity may be required within 20 feet of a shrub. In these cases, fencing will be placed at the greatest possible distance from the shrubs.
4. Transplant up to 58 elderberry shrubs and provide additional plantings as described in the USFWS 1999 *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (Conservation Guidelines). Elderberry shrubs that require removal will be transplanted to an appropriate location within the project area agreed upon by USFWS. Eight elderberry shrubs transplanted in August or September 2008 will compensate an additional 2.5 times the Conservation Guidelines ratios because the shrubs would be transplanted outside of the elderberry shrub dormant season.
5. No insecticides, herbicides, fertilizers, or other chemicals that might harm the beetle or its host plant will be used within 100 feet of elderberry shrubs. All drainage water during and following construction will be diverted away from the elderberry shrubs.

6. Dirt roadways and other areas of disturbed bare ground within 100 feet of elderberry shrubs will be watered at least twice a day to minimize dust emissions.
7. A qualified biologist (monitor) will be on-site for the duration of the transplanting of the elderberry shrubs to ensure that no unauthorized take of the beetle occurs. If unauthorized take occurs, the monitor will have the authority to stop work until corrective measures have been completed. The monitor must immediately report any unauthorized take of the beetle or its habitat to USFWS and to DFG.

With implementation of these measures the project would result in a net gain in habitat for the valley elderberry longhorn beetle and would not result in significant adverse effects on valley elderberry longhorn beetle.

The following mitigation measures would be applied to the **Applicant Preferred Alternative – ASB Setback Levee Alternative, Intermediate Setback Levee Alternative, and Levee Strengthening Alternative**.

### **Mitigation Measure 3.7-a2: Minimize Adverse Effects on Northwestern Pond Turtle**

TRLIA and its primary contractors for engineering design and construction shall ensure that the following measures are implemented to minimize potential project effects on northwestern pond turtles:

- a. Conduct surveys during and after dewatering. A qualified biologist shall observe dewatering of aquatic habitat to determine if northwestern pond turtles are present as water is removed. A qualified biologist shall also conduct surveys for northwestern pond turtles immediately after any dewatering is complete and before any fill of aquatic habitat. If no pond turtles are found, no further mitigation will be required.
- b. Capture and move turtles. If any pond turtles are found, the biologist shall capture them and move them to suitable habitat in the vicinity of the project site.

With implementation of these measures the project would not result in significant adverse effects on northwestern pond turtles.

### **Mitigation Measure 3.7-a3: Minimize Adverse Effects on Giant Garter Snake**

TRLIA and its primary contractors for engineering design and construction shall ensure that the following measures are implemented to minimize and compensate for potential project effects on giant garter snakes. TRLIA has already committed to implementing these measures through the CEQA EIR process. These measures also repeat and/or support mitigation requirements identified in the USFWS BA and the final BO. Additional mitigation measures provided by USFWS as part of the final BO shall also be implemented. Based on requirements in the final BO, TRLIA plans to purchase giant garter snake mitigation credits in an approved mitigation bank at a ratio of 3 acres of credit for each acre of impact (3:1 mitigation ratio). For example, it is estimated that the Applicant Preferred Alternative – ASB Setback Levee Alternative would affect 16.1 acres of aquatic habitat and 10.6 acres of upland habitat. To satisfy mitigation requirements of USFWS, TRLIA plans to acquire 49 acres of aquatic habitat and 32 acres of upland habitat at the Wildlands, Inc., Gilsizer Slough South Giant Garter Snake Conservation Bank, which is an approved conservation bank in Sutter County. This mitigation strategy is consistent with the requirements outlined in the final BO and is in accordance with the *Guidelines for Restoration and/or Replacement of Giant Garter Snake Habitat* and the *Standard Avoidance and Minimization Measures During Construction Activities in Giant Garter Snake (*Thamnophis gigas*) Habitat* (included with the final Biological Opinion in Appendix H). Other mitigation measures for giant garter snake impacts are as follows:

1. A worker awareness training program for construction personnel will be conducted by a qualified biologist prior to beginning construction activities. The program will provide workers with information on their responsibilities with regard to the snake, an overview of the life-history of this species, a description of measures to minimize potential for take of the snake, and an explanation of the possible penalties for not



properly implementing these measures. Written documentation of the training will be submitted to USFWS within 30 days of its completion.

2. All construction activity within snake habitat (aquatic and upland) would be conducted between May 1 and October 1. This is the active period for the snake and direct mortality is lessened because snakes are expected to actively move and avoid danger. More danger is posed to snakes during their inactive period because they are occupying underground burrows or crevices and are more susceptible to direct effects, especially during excavation activities. If it appears that construction activity may need to extend beyond October 1, the project proponent(s) would contact USFWS as soon as possible and no later than August 15 to determine if additional measures are necessary to minimize take of the snake. Dewatering of suitable aquatic habitat will not occur before April 15, and dewatered habitat will remain dry for at least 15 days prior to fill or excavation.
3. At least 30 days prior to initiating construction activities, the project proponents will submit the names and curriculum vitae of the biological monitor(s) for the project to USFWS for review and approval.
4. Within 24 hours before beginning construction activities, areas within 200 feet of suitable aquatic habitat for giant garter snake will be surveyed by a qualified biologist. The biologist will provide USFWS written documentation of the monitoring efforts within 48 hours after the survey is completed. Habitat will be re-inspected by the monitoring biologist whenever a lapse in construction activity of 2 weeks or greater occurs. The biologist will be present on-site during initial ground disturbance activities, including clearing and grubbing/stripping. The biologist will be available throughout the construction period and will conduct regular monitoring visits to ensure avoidance and minimization measures are being properly implemented.
5. The number of access routes, number and size of staging areas, and the total area of the proposed project activity will be limited to the minimum necessary. Routes and boundaries will be clearly demarcated. Movement of heavy equipment to and from the project site will be restricted to established roadways to minimize habitat disturbance. Project-related vehicles will observe a 20-mile-per-hour speed limit within construction areas, except on county roads and on state and federal highways.
6. The applicant will restore 0.11 acre (.04 ha) of temporarily affected aquatic snake habitat according to the *Guidelines for Restoration and/or Replacement of Giant Garter Snake Habitat* and the *Standard Avoidance and Minimization Measures During Construction Activities in Giant Garter Snake* (*Thamnophis gigas*) *Habitat* (included with the final Biological Opinion in Appendix H).
7. Permanent loss of giant garter snake habitat will be compensated for at a ratio of 3:1 at a USFWS approved mitigation site.

With implementation of these measures the project would result in a regional net increase in giant garter snake habitat and would not result in significant adverse effects on giant garter snake.

The following mitigation measure would be applied to the **Applicant Preferred Alternative – ASB Setback Levee Alternative, Intermediate Setback Levee Alternative, and Levee Strengthening Alternative.**

#### **Mitigation Measure 3.7-b: Conduct Preconstruction Surveys and Protect Active Nests to Minimize Effects on Nesting Raptors**

TRLIA and its primary construction contractor shall ensure that the following measures are implemented to minimize potential project effects on nesting raptors. TRLIA has already committed to implementing these measures through the CEQA EIR process. Nesting raptor surveys began in February 2008 within the project construction area, in accordance with the requirements of this mitigation measure.

- (a) Conduct preconstruction surveys. Because project construction activity would occur during the raptor breeding season (February 15 to September 15), a qualified biologist shall conduct preconstruction surveys to

identify active nests in the nonorchard trees within ½ mile of potential construction areas (including staging and borrow areas). Because of the linear nature of project construction, preconstruction surveys may be phased to accommodate construction activities; suitable nesting habitat shall be surveyed only when construction activities would encroach within ½ mile of unsurveyed areas. Surveys shall be conducted no less than 14 days and no more than 30 days before construction encroaches within ½ mile of unsurveyed areas. If no active nests are found, no further mitigation shall be required.

- (b) Establish protective buffers around active nests. If an active nest is found, an appropriate buffer to avoid impacts shall be determined by a qualified biologist. No project activities shall commence within the buffer area until a qualified biologist confirms that the nest is no longer active. The size of the buffer may vary, depending on the nest location, nest stage, and construction activity. Monitoring of the nest by a qualified biologist may be required if an activity could adversely affect the nest.

With implementation of these measures the project would not result in significant adverse effects on nesting raptors.

## **3.8 FISHERIES**

### **3.8.1 EXISTING CONDITIONS**

Flood protection improvements that are being considered for Segment 2 of the Feather River Levee Repair Project (FRLRP) could potentially affect aquatic resources within the lower Feather River. The Feather River provides important habitat for native anadromous and resident Central Valley fishes, including species listed as threatened or endangered under the federal Endangered Species Act (ESA).

The following analysis addresses direct effects of the Applicant Preferred Alternative – Above Star Bend (ASB) Setback Levee Alternative (also referred to as the “Applicant Preferred Alternative”) and other alternatives. Potential indirect effects of the Applicant Preferred Alternative and other alternatives are addressed in Chapter 4.0, “Cumulative and Growth-Inducing Effects.” No impacts to fish species in the Yuba-Feather-Bear River system were identified in the environmental compliance documents prepared for development projects that are planned and/or proposed in south Yuba County; therefore, no growth-inducing effects on fish species or area fisheries are discussed in Chapter 4.0. For an evaluation of the combined beneficial effects related to expanding the floodplain corridor from implementation of other past, present, and future projects in the region (e.g., future projects that may be developed through the Lower Yuba River Fisheries Technical Working Group), see Section 4.2.4.4, “Fisheries.”

#### **3.8.1.1 FEATHER RIVER FISHERIES RESOURCES**

The lower Feather River supports a diverse assemblage of native and nonnative species (Table 3.8-1, “Fishes Present in the Lower Feather River”). Anadromous and other migratory species include Central Valley fall-run chinook salmon, Central Valley spring-run chinook salmon, Central Valley steelhead, white sturgeon, green sturgeon, Pacific lamprey, striped bass, and American shad. Juvenile winter-run chinook salmon may also periodically move into the lower Feather River during their downstream migrations in the Sacramento River.

Oroville Dam is the upstream limit of anadromous fish migration in the Feather River. Most of the water released from Oroville Reservoir is diverted at Thermalito Diversion Dam into the Thermalito Complex. During controlled releases, water is released at a constant rate of 600 cubic feet per second (cfs) through the Fish Barrier Dam to the Feather River Fish Hatchery and then into the low-flow section of the Feather River. This 8-mile reach, which extends downstream to the Thermalito Afterbay outlet, provides important spawning and rearing habitat for spring-run chinook salmon and steelhead. 14 miles of additional spawning and rearing habitat exists between the Thermalito Afterbay outlet and the mouth of Honcut Creek, which is located upstream of the project area (see Figure 1-2).

#### **3.8.1.2 SPECIAL-STATUS SPECIES**

For the purposes of this analysis, special-status fish species are those that are legally protected or are otherwise considered sensitive by federal resource conservation agencies. Special-status fish species addressed in this section include:

- ▶ species listed as threatened or endangered under the ESA; and
- ▶ species identified by the U.S. Fish and Wildlife Service (USFWS) or National Marine Fisheries Service (NMFS) as species of special concern.

**Table 3.8-1  
Fishes Present in the Lower Feather River**

| Common Name                                                      | Scientific Name                    | Native (N) or Introduced (I) |
|------------------------------------------------------------------|------------------------------------|------------------------------|
| Green sturgeon                                                   | <i>Acipenser medirostris</i>       | N                            |
| White sturgeon                                                   | <i>Acipenser transmontanus</i>     | N                            |
| Sacramento sucker                                                | <i>Catostomus occidentalis</i>     | N                            |
| Riffle sculpin                                                   | <i>Cottus gulosus</i>              | N                            |
| Tule perch                                                       | <i>Hysterocarpus traski</i>        | N                            |
| Pacific lamprey                                                  | <i>Lampetra tridentata</i>         | N                            |
| California roach                                                 | <i>Lavinia symmetricus</i>         | N                            |
| Hardhead                                                         | <i>Mylopharodon conocephalus</i>   | N                            |
| Central Valley steelhead                                         | <i>Oncorhynchus mykiss</i>         | N                            |
| Rainbow trout                                                    | <i>Oncorhynchus mykiss</i>         | N                            |
| Sacramento River winter-run chinook salmon                       | <i>Oncorhynchus tshawytscha</i>    | N                            |
| Central Valley spring-run chinook salmon                         | <i>Oncorhynchus tshawytscha</i>    | N                            |
| Central Valley fall/late fall-run chinook salmon                 | <i>Oncorhynchus tshawytscha</i>    | N                            |
| Sacramento splittail                                             | <i>Pogonichthys macrolepidotus</i> | N                            |
| Sacramento pikeminnow                                            | <i>Ptychocheilus grandis</i>       | N                            |
| Speckled dace                                                    | <i>Rhinichthys osculus</i>         | N                            |
| American shad                                                    | <i>Alosa sapidissima</i>           | I                            |
| Mosquitofish                                                     | <i>Gambusia affinis</i>            | I                            |
| Green sunfish                                                    | <i>Lepomis cyanellus</i>           | I                            |
| Bluegill                                                         | <i>Lepomis macrochirus</i>         | I                            |
| Redear sunfish                                                   | <i>Lepomis microlophus</i>         | I                            |
| Smallmouth bass                                                  | <i>Micropterus dolomieu</i>        | I                            |
| Striped bass                                                     | <i>Morone saxatilis</i>            | I                            |
| Sources: California Department of Fish and Game 1991, Moyle 2002 |                                    |                              |

A total of seven special-status fish species have the potential to occur in the lower Feather River, as described below. Of the seven species, green sturgeon, Central Valley steelhead Evolutionarily Significant Unit (ESU), Sacramento River winter-run Chinook salmon ESU, and Central Valley spring-run Chinook salmon ESU are federally listed as threatened or endangered species. The Central Valley fall/late fall-run chinook salmon ESU and Pacific lamprey are identified by the NMFS as species of special concern. USFWS delisted Sacramento splittail from its threatened status on September 22, 2003. Brief descriptions follow for the special-status species with potential to occur in the lower Feather River (Table 3.8-2).

**Table 3.8-2  
Special-Status Fish Species Potentially Occurring in the Lower Feather and Yuba Rivers**

| Species                                                                             | Status <sup>1</sup><br>USFWS/<br>NMFS | Habitat                                                                                                                                                                                                        | Potential to Occur in the Lower Feather River                                                                                                         |
|-------------------------------------------------------------------------------------|---------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| Green sturgeon<br><i>Acipenser medirostris</i>                                      | T                                     | Requires cold, freshwater streams with suitable gravel for spawning; rears seasonally inundated floodplains, rivers, tributaries, and Delta                                                                    | Occurs in the lower Feather River                                                                                                                     |
| Pacific lamprey<br><i>Lampetra tridentata</i>                                       | SSC                                   | Requires cool, freshwater streams with suitable gravel for spawning                                                                                                                                            | Occurs in the lower Feather River                                                                                                                     |
| Central Valley steelhead ESU<br><i>Oncorhynchus mykiss</i>                          | T                                     | Requires cold, freshwater streams with suitable gravel for spawning; rears in seasonally inundated floodplains, rivers, and tributaries, and in the Delta                                                      | Occurs in the lower Feather River                                                                                                                     |
| Sacramento River winter-run chinook salmon ESU<br><i>Oncorhynchus tshawytscha</i>   | E                                     | Requires cold, freshwater streams with suitable gravel for spawning; rears in seasonally inundated floodplains, rivers, and tributaries, and in the Delta                                                      | Occurs in the Sacramento River and tributaries; adults and juveniles may stray into the Feather River; unlikely to occur adjacent to the project site |
| Central Valley spring-run chinook salmon ESU<br><i>Oncorhynchus tshawytscha</i>     | T                                     | Requires cold, freshwater streams with suitable gravel for spawning; rears in seasonally inundated floodplains, rivers, and tributaries, and in the Delta                                                      | Occurs in the lower Feather River                                                                                                                     |
| Central Valley fall/late fall-run chinook salmon<br><i>Oncorhynchus tshawytscha</i> | SSC                                   | Requires cold, freshwater streams with suitable gravel for spawning; rears in seasonally inundated floodplains, rivers, and tributaries, and in the Delta                                                      | Occurs in the lower Feather and Yuba Rivers                                                                                                           |
| Sacramento splittail<br><i>Pogonichthys macrolepidotus</i>                          | DT                                    | Spawning and juvenile rearing from winter to early summer in shallow weedy areas inundated during seasonal flooding in the lower reaches and flood bypasses of the Sacramento River, including the Yolo Bypass | Occurs in the lower Feather River                                                                                                                     |

Notes: ESU = Evolutionarily Significant Unit; NMFS = National Marine Fisheries Service; USFWS = U.S. Fish and Wildlife Service

<sup>1</sup> Legal Status Definitions  
Federal Listing Categories (USFWS and NMFS)  
E Endangered (legally protected)  
T Threatened (legally protected)  
DT Delisted from threatened status  
SSC Species of Special Concern

Source: Data compiled by EDAW in 2007 from the California Natural Diversity Database (2007), past environmental impact reports addressing the project area, and sources cited in this section

## Green Sturgeon

Green sturgeon (*Acipenser medirostris*) is listed as threatened by NMFS (71 *Federal Register* [FR] 17757, April 7, 2006). Green sturgeon occurs in the lower reaches of large rivers, including the Sacramento and San Joaquin River basins, and in the Eel, Mad, Klamath, and Smith Rivers. Green sturgeon is found primarily in the Sacramento River and occasionally in the lower Feather River. Green sturgeon adults and juveniles occur throughout the upper Sacramento River, based upon observations incidental to winter-run chinook monitoring at the Red Bluff Diversion Dam in Tehama County (National Marine Fisheries Service 2005). Green sturgeon spawn predominantly in the upper Sacramento River. They are thought to spawn every 3–5 years (Tracy 1990). Their spawning period is March to July, with a peak from mid-April to mid-June (Moyle, Foley, and Yoshiyama

1992). Juveniles inhabit the Bay-Delta estuary until they are approximately 4–6 years old, when they migrate to the ocean (Kohlhorst et al. 1991). Green sturgeon have historically been present in the Feather River. Reproduction is not likely to take place within the Feather River, but rather in the Sacramento River. However, green sturgeon are consistently documented within the Feather River and are known to be present in the Yuba River, which enters the Feather River immediately upstream of the project area. Therefore, individuals must pass through the project area during migrations to and from the Yuba River and upstream areas of the Feather River.

### **Pacific Lamprey**

Pacific lamprey is a NMFS species of special concern. Similar to chinook salmon and steelhead (described below), Pacific lamprey (*Lampetra tridentata*) adults migrate upstream from the ocean during the winter and spring to spawn (Moyle 2002). Spawning occurs over gravel substrates. Larval lamprey rear in sand and mud substrates, gradually moving downstream over the rearing period. Little is known about their habitat needs or population trends. Adult Pacific lamprey would only be found in the Feather River in the vicinity of the FRLRP project site as they pass through the area during spawning migrations. Juvenile lamprey would pass through the area as they gradually move downstream to the ocean.

### **Central Valley Steelhead**

Historically, Central Valley steelhead (*Oncorhynchus mykiss*) spawned and reared in most of the accessible upstream reaches of Central Valley rivers, including the Yuba, Feather, and Sacramento Rivers and their perennial tributaries. Steelhead generally migrated farther than chinook salmon (described below) into tributaries and headwater streams where cool, well-oxygenated water is available year round.

In the Central Valley, steelhead are now restricted to the upper Sacramento River downstream of Keswick Reservoir; the lower reaches of large tributaries downstream of impassable dams; small, perennial tributaries of the Sacramento River mainstem and large tributaries; and the Bay-Delta system.

Population estimates of steelhead on the Feather River have not been performed; however, since 1967 an average of approximately 900 steelhead has returned each year to the Feather River Fish Hatchery (California Department of Fish and Game 2006).

The upstream migration of adult steelhead in the mainstem Sacramento River historically started in July, peaked in September, and continued through February or March. Central Valley steelhead spawn mainly from January through March, but spawning has been reported from late December through April (McEwan and Jackson 1996). During spawning, the female digs a redd (gravel nest) in which she deposits her eggs, which are then fertilized by the male. Egg incubation time in the gravel is determined by water temperature, varying from approximately 19 days at an average water temperature of 15.5°C to approximately 80 days at an average temperature of 14.5°C (McEwan and Jackson 1996).

Steelhead fry usually emerge from the gravel 2–8 weeks after hatching (Barnhart 1986, Reynolds et al. 1993), between February and May, sometimes extending into June (California Department of Fish and Game 1991). Newly emerged steelhead fry move to shallow, protected areas along streambanks but move to faster, deeper areas of the river as they grow. Juvenile steelhead feed on a variety of aquatic and terrestrial insects and other small invertebrates.

Juvenile steelhead rear throughout the year and may spend 1–3 years in fresh water before emigrating to the ocean. Smoltification, the physiological adaptation that juvenile salmonids undergo to tolerate saline waters, occurs in juveniles as they begin their downstream migration. Smolting steelhead generally emigrate from March to June (California Department of Fish and Game 1991).



NMFS completed a status review of steelhead populations in Washington, Oregon, Idaho, and California, and identified 15 ESUs in this range. On August 9, 1996, NMFS issued a proposed rule to list five of these ESUs (including the Central Valley steelhead) as endangered under ESA, and five as threatened (61 *Federal Register* [FR] 155). The Central Valley steelhead ESU was later listed as threatened (downgraded from its proposed status of endangered) (63 FR 13347, March 19, 1998), and critical habitat (which included the lower Feather and Yuba Rivers) was designated for this ESU (65 FR 7764, February 16, 2000). However, following a lawsuit (*National Association of Home Builders et al. v. Donald L. Evans, Secretary of Commerce, et al.*) (see “Central Valley Spring-Run Chinook Salmon” below), NMFS rescinded the listing. After further review, critical habitat for the Central Valley steelhead ESU was designated on August 12, 2005. Critical habitat is designated to include select waters in the Sacramento and San Joaquin River basins, including the Feather River.

The Feather River in the vicinity of the FRLRP project site does not provide spawning habitat for Central Valley steelhead, although adults pass through the area as they migrate to spawning sites upstream. While rearing, juvenile steelhead may spend a more extended period in the vicinity of the FRLRP project site.

### **Sacramento River Winter-Run Chinook Salmon**

The Sacramento River winter-run chinook salmon (*Oncorhynchus tshawytscha*) ESU is listed as endangered by NMFS. Sacramento River winter-run chinook salmon do not spawn in the Feather River, but juveniles may periodically move into the lower portions of the river from the Sacramento River during downstream migration. Therefore, if Sacramento River winter-run chinook salmon occur in the Feather River in the vicinity of the FRLRP project site, it would only be juveniles and only intermittently for short periods.

Juvenile winter-run chinook salmon rear and emigrate in the Sacramento River from July through March (Hallock and Fisher 1985). Juveniles descending the Sacramento River above Red Bluff Diversion Dam (RBDD) from August through October, and possibly November, are mostly presmolts (smolts are juveniles that are physiologically ready to enter seawater) and probably rear in the Sacramento River below RBDD. Juveniles have been observed in the Delta from October through December, especially during high Sacramento River discharges caused by late fall and early winter storms.

Cover structures, space, and food are necessary components of rearing habitat for all races of chinook salmon. Suitable habitat includes areas with instream and overhead cover in the form of undercut banks; downed trees; and large, overhanging tree branches. The organic materials forming fish cover also help provide sources of food, in the form of both aquatic and terrestrial insects. Growth of juvenile chinook salmon in floodplain habitat is fast relative to growth in river habitat. Juvenile salmon have been found to have growth rates in excess of 1 millimeter (mm) per day when they rear in flooded habitat and as much as 20 mm in 2–3 weeks (U.S. Army Corps of Engineers 2001). The water temperature is typically higher in floodplain habitat than in main channel habitats. Although increased temperature increases metabolic requirements, the productivity in flooded habitat is also increased, resulting in higher growth rates (Sommer et al., 2001). The production of drift invertebrates in the Yolo Bypass has been found to be one to two times greater than in the river (Sommer et al. 2001). Also, grasses that are flooded support invertebrates that are also a substantial source of food for rearing juveniles. Increased areas resulting from flooded habitat can also reduce the competition for food and space and potentially decrease the possible encounters with predators (Sommer et al., 2001). Juvenile chinook salmon that grow faster are likely to migrate downstream sooner, which helps to reduce the risks of predation and competition in freshwater systems.

Juvenile chinook salmon in the Sacramento River move out of upstream spawning areas into downstream habitats in response to many factors, including inherited behavior, habitat availability, flow, competition for space and food, and water temperature. The number of juveniles that move, and the timing of movement are highly variable. Storm events and the resulting high flows appear to trigger movement of substantial numbers of juvenile chinook salmon to downstream habitats. In general, juvenile abundance in the Delta increases as flow increases (U.S. Fish and Wildlife Service 1993).

Winter-run salmon smolts may migrate through the Delta and bay to the ocean from December through as late as May (Stevens 1989). The Sacramento River channel is the main migration route through the Delta. Adult winter-run chinook salmon spend 1–3 years in the ocean. About 67% of the adult escapement that leaves the ocean to spawn in the Sacramento River consists of 3-year-olds, 25% consists of 2-year-olds, and 8% consists of 4-year-olds (Hallock and Fisher 1985).

Adult winter-run chinook salmon leave the ocean and migrate through the Delta into the Sacramento River from November through July. Salmon migrate upstream past RBDD from mid-December through July, and most of the spawning population has passed RBDD by late June. Winter-run chinook salmon spawn from mid-April through August, and incubation continues through October. The primary spawning grounds in the Sacramento River are above RBDD. As mentioned above, adult winter-run chinook salmon do not enter the Feather River.

### **Central Valley Spring-Run Chinook Salmon**

Central Valley spring-run chinook salmon (*Oncorhynchus tshawytscha*) historically were the second most abundant run of Central Valley chinook salmon (Fisher 1994). They occupied the headwaters of all major river systems in the Central Valley where there were no natural barriers. Adults returning to spawn ascended the tributaries to the upper Sacramento River, including the Pit, McCloud, and Little Sacramento Rivers. They also occupied Cottonwood, Battle, Antelope, Mill, Deer, Stony, Big Chico, and Butte Creeks, and the Feather, Yuba, American, Mokelumne, Stanislaus, Tuolumne, Merced, San Joaquin, and Kings Rivers. Spring-run chinook salmon migrated farther into headwater streams where cool, well-oxygenated water is available year round.

Current surveys indicate that remnant, nonsustaining spring-run chinook salmon populations may be found in Cottonwood, Battle, Antelope, and Big Chico Creeks (California Department of Water Resources 1997). More sizable, consistent runs of naturally produced fish are found only in Mill and Deer Creeks. The Feather River Fish Hatchery sustains the spring-run population on the Feather River, but the genetic integrity of that run is questionable (California Department of Water Resources 1997). Estimates since 1953 on the Feather River indicate that numbers of spring-run chinook salmon returning to the hatchery average around 2,115. Although the estimates increased dramatically from the 1990s (California Department of Fish and Game 2006) through the middle of this decade, recent downward trends in salmonid populations have more recently reached alarmingly low levels. The occurrence of Central Valley spring-run chinook salmon in the Feather River near the FRLRP project site would be limited to adults moving upstream to the Feather River Fish Hatchery and juveniles emigrating downstream.

Juveniles display considerable variation in stream residence and migratory behavior. Juvenile spring-run chinook salmon may leave their natal streams as fry soon after emergence or rear for several months to a year before migrating as smolts or yearlings (Yoshiyama, Fisher, and Moyle 1998). Triggers for downstream movement are similar to those described above for winter-run Chinook salmon.

Historical records indicate that adult spring-run chinook salmon enter the main stem Sacramento River in February and March and continue to their spawning streams, where they then hold in deep, cold pools until they spawn. Spring-run are sexually immature during their spawning migration. Some adult spring-run chinook salmon start arriving in the Feather River below the Fish Barrier Dam in June. They remain there until the fish ladder opens in early September.

Spawning and rearing requirements for spring-run chinook salmon are similar to those identified above in the discussion for winter-run chinook salmon. Spawning occurs in gravel beds in late August through October, and emergence takes place in March and April. Spring-run chinook salmon appear to emigrate at two different life stages: fry and yearlings. Fry move between February and June, while the yearling spring-run emigrate October to March, peaking in November (Cramer and Demko 1997).

On March 9, 1998 (63 FR 11481), NMFS issued a proposed rule to list spring-run Chinook salmon as endangered. NMFS designated the Central Valley spring-run chinook as threatened on September 16, 1999 (64 FR 50393).

On February 5, 1999, the California Fish and Game Commission listed spring-run chinook salmon as threatened under CESA. Critical habitat had originally been designated for Central Valley spring-run chinook salmon by NMFS (65 FR 7764, February 16, 2000). However, following a lawsuit (*National Association of Home Builders et al. v. Donald L. Evans, Secretary of Commerce, et al.*), NMFS rescinded the listing. After further review, critical habitat for the Central Valley spring-run chinook salmon ESU was designated on August 12, 2005. Critical habitat is designated to include select waters in the Sacramento and San Joaquin River basins, including the Feather River.

### **Central Valley Fall/Late Fall-Run Chinook Salmon**

The Central Valley fall/late fall-run chinook salmon ESU (*Oncorhynchus tshawytscha*) is identified by the NMFS as species of special concern. Spawning escapement surveys on the Feather River are conducted annually by California Department of Fish and Game (DFG) between the Oroville Fish Barrier Dam and the Thermalito Afterbay outlet and between the afterbay outlet and the Gridley boat ramp above Honcut Creek. Annual estimates (since 1953) of the population of fall-/late fall-run chinook salmon based on these survey counts and hatchery returns have averaged approximately 49,000 fish (California Department of Fish and Game 2006). The occurrence of Central Valley fall/late fall-run chinook salmon in the Feather River near the FRLRP project site would be limited to adults moving upstream to the Feather River Fish Hatchery and juveniles emigrating downstream.

Spawning and rearing requirements for fall-/late fall-run chinook salmon are similar to those identified above in the discussion for winter-run chinook salmon. Juvenile fall-/late fall-run chinook salmon typically rear in fresh water (in their natal streams, the Sacramento River, and the Delta) for up to 5 months before entering the ocean. Juveniles migrate downstream during January through June. Juvenile chinook salmon prefer water depths of 0.5–3.3 feet and velocities of 0.26–1.64 feet per second (Raleigh et al. 1986). Important winter habitat for juvenile chinook salmon includes flooded bars, side channels, and overbank areas with relatively low water velocities. Juvenile chinook salmon have been found to successfully rear in floodplain habitat, which routinely floods but is dry at other times. Growth rates appear to be enhanced by the conditions found in floodplain habitat.

Fall-/late fall-run chinook salmon emigrate as fry and subyearlings and remain off the California coast during their ocean migration (63 FR 11481, March 9, 1998).

Adult fall-/late fall-run chinook salmon enter the Sacramento and San Joaquin River systems from July through April and spawn from October through February. During spawning, the female digs a redd (gravel nest) in which she deposits her eggs, which are then fertilized by the male. Optimal water temperatures for egg incubation are 6.7°–12.2°C (Rich 1997). Newly emerged fry remain in shallow, lower-velocity edgewater, particularly where debris congregates and makes the fish less visible to predators (California Department of Fish and Game 1998). The duration of egg incubation and time of fry emergence depends largely on water temperature. In general, eggs hatch after a 3- to 5-month incubation period, and alevins (yolk-sac fry) remain in the gravel until their yolk-sacs are absorbed (2–3 weeks).

### **Sacramento Splittail**

Recent data indicate that Sacramento splittail (*Pogonichthys macrolepidotus*) occur in the Sacramento River as far upstream as the RBDD (Sommer, Baxter, and Herbold 1997), and that some adults spend the summer in the mainstem Sacramento River rather than returning to the Bay-Delta estuary (Baxter 1999). The distribution and extent of spawning and rearing along the mainstem Sacramento River is unknown. Although Sacramento splittail are known to occur in the lower Feather River, occurrences are intermittent and infrequent. Any presence of Sacramento splittail in the Feather River near the FRLRP project site would be limited to adults and potentially juveniles spending short periods in the area then returning downstream to areas more typically considered part of their range.

Sacramento splittail spawn between early March and May over flooded terrestrial or aquatic vegetation in lower reaches of the Sacramento River (Wang 1986, Moyle et al. 1995, Moyle 2002). Spawning has been observed to

occur as early as January and to continue through July (Wang 1986). Larval splittail are commonly found in the shallow, vegetated areas where spawning occurs. Larvae eventually move into deeper, open-water habitats as they grow and become juveniles. During late winter and spring, young-of-year juvenile splittail (i.e., those less than 1-year old) are found in floodplain habitat, sloughs, rivers, and Delta channels near spawning habitat. Juvenile splittail gradually move from shallow, nearshore habitats to the deeper, open-water habitats of Suisun and San Pablo Bays (Wang 1986). In areas upstream of the Delta, juvenile splittail can be expected to be present in the flood basins (i.e., Sutter and Yolo Bypasses and the Sacramento River) when these areas are flooded during the winter and spring.

In 1999, 4 years after candidate status, the splittail was listed as threatened under ESA (64 FR 25, March 10, 1999). Fall mid-water trawl surveys indicate that abundance of juvenile splittail has been highly variable from year to year, with peaks and declines coinciding with wet and dry periods, respectively, and correlated with the availability of flooded shallow-water habitat. After the listing, the State Water Contractors, the San Luis and Delta-Mendota Water Authority, and others challenged the listing, contending that it violated ESA and the Administrative Procedures Act. On June 23, 2000, the U.S. District Court in Fresno ruled in favor of the plaintiffs and found the listing unlawful. On September 22, 2003, USFWS delisted splittail as a threatened species, indicating that habitat restoration actions such as those associated with the CALFED Bay-Delta Program (CALFED program) and the Central Valley Project Improvement Act are likely to keep the splittail from becoming endangered in the foreseeable future (68 FR 55139, September 22, 2003).

## **3.8.2 ENVIRONMENTAL CONSEQUENCES**

### **3.8.2.1 SIGNIFICANCE CRITERIA**

A project alternative would have a significant impact on aquatic resources if it would:

- ▶ substantially reduce or degrade the habitat of a special-status species, potentially resulting in a reduction in special-status species abundance;
- ▶ directly or indirectly reduce the growth, survival, or reproductive success of substantial numbers of special-status species;
- ▶ directly or indirectly reduce the growth, survival, or reproductive success of individuals of a species listed or proposed for listing as threatened or endangered under the ESA;
- ▶ substantially interfere with, or prevent the movement or migration of, any fish species;
- ▶ substantially reduce any fish populations; or
- ▶ substantially reduce the quality and quantity of important habitat for any fish species or their prey species.

The Applicant Preferred Alternative – ASB Setback Levee Alternative and other alternatives, although capable of generating both positive and adverse effects for a variety of fish species, would not be capable of generating substantial adverse effects on common fish species with large local and regional populations. For common fish species, the Applicant Preferred Alternative and other alternatives do not cover a large enough area nor generate the types of effects that would substantially reduce the quality or quantity of habitat for these species; substantially interfere with or prevent the movement or migration of common fish species; or substantially reduce the population of common fish species. The following impact analysis focuses on the potential for the Applicant Preferred Alternative and other alternatives to affect special-status fish species as described above in Section 3.8.1, “Existing Conditions.” Potential indirect effects of the Applicant Preferred Alternative and other alternatives are addressed in Chapter 4.0, “Cumulative and Growth-Inducing Effects.” As discussed above, no growth-inducing effects on fish species or area fisheries are discussed in Chapter 4.0. For an evaluation of the

combined beneficial effects related to expanding the floodplain corridor from implementation of other past, present, and future projects in the region (e.g., future projects that may be developed through the Lower Yuba River Fisheries Technical Working Group), see Section 4.2.4.4, “Fisheries.”

### **3.8.2.2 APPLICANT PREFERRED ALTERNATIVE – ASB SETBACK LEVEE ALTERNATIVE**

#### **AP Impact 3.8-a: Potential Adverse Water Quality Effects on Special-Status Fish Species**

##### ***Sediments, Turbidity, and Contaminants***

Construction of the proposed setback levee, development of borrow areas, removal of the existing Feather River levee, and other ground disturbing project activities associated with the Applicant Preferred Alternative – ASB Setback Levee Alternative would result in several hundred acres of soil disturbance. These disturbed areas could be susceptible to erosion and transport of soil and sediment into local waterways and the Feather River. Soil erosion could temporarily increase turbidity and sedimentation downstream of the construction sites if soils are transported in river flows or stormwater runoff (See Section 3.4, “Water Quality” for additional discussion of this issue).

Fish population levels and survival have been linked to levels of turbidity and siltation in a watershed. Prolonged exposure to high levels of suspended sediment could create a loss of visual capability in fish, leading to a reduction in feeding and growth rates; a thickening of the gill epithelia, potentially causing the loss of respiratory function; clogging and abrasion of gill filaments; and increases in stress levels, reducing the tolerance of fish to disease and toxicants (Waters 1995).

Also, high levels of suspended sediments would cause the movement and redistribution of fish populations, and could affect physical habitat. Once suspended sediment is deposited, it could reduce water depths in pools, decreasing the water’s physical carrying capacity for juvenile and adult fish (Waters 1995). Increased sediment loading could degrade food-producing habitat downstream of the project area. Sediment loading could interfere with photosynthesis of aquatic flora and displace aquatic fauna. Many fish are sight feeders, and turbid waters reduce the ability of these fish to locate and feed on prey. Some fish, particularly juveniles, could become disoriented and leave areas where their main food sources are located, ultimately reducing their growth rates.

Avoidance is the most common result of increases in turbidity and sedimentation. Fish will not occupy areas unsuitable for survival unless they have no other option. Therefore, the Applicant Preferred Alternative could cause fish habitat to become limited if high turbidity resulting from construction-related erosion were to preclude a species from occupying habitat required for specific life stages.

In addition, the potential exists for contaminants such as fuels, oils, and other petroleum products used in construction activities to be introduced into the water system directly or through surface runoff. Contaminants may be toxic to fish or may alter oxygen diffusion rates and cause acute and chronic toxicity to aquatic organisms, thereby reducing growth and survival.

Any of the impact mechanisms listed above could directly or indirectly reduce the growth, survival, or reproductive success of individuals of a species listed or proposed for listing as threatened or endangered. However, the impact cannot be specifically quantified because the volume, timing, and location of any sediment or contaminant releases that might occur cannot be determined and the fish species and life stage (adult vs. juvenile) that might be present during a potential sediment or contaminant release cannot be determined since special-status fish species only occur infrequently and intermittently in the project area (see description of special-status species above). It would be purely conjecture to say that a particular number of individual fish or acreage of fish habitat would be adversely affected. Nevertheless, because the potential exists for project construction to directly reduce the growth, survival, or reproductive success of individuals of a species listed or proposed for listing as threatened or endangered under the ESA, a significant adverse effect could occur.

## ***Potential Borrow Material Contaminants***

Borrow material for construction of the proposed setback levee would be obtained from soil borrow areas between the setback levee alignment and the Feather River and east of setback levee alignment. Material from the existing levee would be used to fill borrow areas in the setback area, and would be exposed to inundation during flood events. Because of the age of the existing levee and the unknown condition of the proposed borrow areas, there is potential for soil material used in the setback levee and to fill borrow areas to contain elevated levels of hazardous substances. Other disturbed soils in the proposed levee setback area could contain such substances as well (see Section 3.5, “Hazardous Materials,” for additional discussion of this issue). If present, hazardous substances could be released into flowing water when it enters the levee setback area and could harm sensitive fish and habitat resources and result in a significant adverse effect. Again, for the reasons described above, attempting to quantify the effects of this impact on special-status fish species would be purely conjecture.

## **AP Impact 3.8-b: Substantially Reduce the Quality and Quantity of Important Habitat for Special-Status Fish Species**

### ***Loss of Overhead Cover and Instream Woody Material***

Under the Applicant Preferred Alternative – ASB Setback Levee Alternative, no losses of riparian vegetation that contributes to fish habitat would result from construction of the proposed setback levee. Degradation/removal of the existing levee would be conducted from within the levee right-of-way and the land side of the right-of-way. No riparian vegetation or instream woody material would be removed during degradation of the existing levee. However, 3–4 acres of riparian vegetation that potentially provides overhead cover for fish or contributes instream woody material to the Feather River channel would be cleared on the water side of the existing levee during construction of the floodplain drainage swale to allow drainage of the levee setback area to the Feather River channel after flood events (see Figure 2-1 in Chapter 2, “Alternatives”). A majority of this riparian vegetation does not provide fish habitat all year, but only during high water events when waters in the Feather River leave the banks and inundate the floodway. Any removal of riparian vegetation or woody material in the floodplain during construction of the drainage swale would be minor and entirely offset by increased riparian habitat within the alignment of the existing levee over time. The site of the proposed drainage swale is the existing outfall channel for discharges from the current Pump Station No. 3. Rather than constructing a completely new drainage channel through riparian vegetation, expanding the existing outfall channel to function as the floodplain drainage swale minimizes earth moving, ground disturbance, and impacts to riparian vegetation. Effects on fish habitat would be negligible and no significant adverse effects would occur.

### ***Increased Fish Habitat***

The levee system along much of the lower Feather River limits aquatic and riparian habitats to relatively narrow corridors. Setting back the levee along the proposed setback levee alignment would widen the lower Feather River floodway by as much as approximately 0.5 mile. This action would expand the available floodplain habitat for fish by approximately 1,300 acres during large flood events. A smaller portion of the setback area would be inundated during more frequent flood events. For example, hydrologic modeling indicates that approximately 75-acres of the setback area would be inundated at least seven consecutive days from March 15 to May 15, in 2 out of every 3 years.

Floodplains provide important seasonal habitat for native fish species during the winter and spring flood periods. For this reason, a key restoration goal of the CALFED program is to improve the connectivity between rivers and floodplain habitat, as well as increase the amount of shallow water habitat in the Central Valley (CALFED Bay-Delta Program 2001). Numerous studies have shown that shallow water and dense vegetation in these areas provide highly productive rearing areas for numerous species, including chinook salmon and Sacramento splittail (Sommer, Baxter, and Herbold 1997; Baxter, Harrell, and Grimaldo 1996; Moyle et al. 2000). The newly created floodplain could create refugia for fish during peak flows even if the habitat is only temporary. Many of these



benefits would occur even if the levee setback area continued in agricultural operations. If habitat restoration were undertaken in all or part of the levee setback area, this could help reverse regional riparian habitat losses; increase the effective amount and quality of habitat available to fish; and improve the conveyance capacity of the floodplain to provide migration corridors for, and sustain, fish populations. Providing wider floodplains and larger habitat units is especially important for migratory fish species, such as salmon and steelhead. Because the Applicant Preferred Alternative – ASB Setback Levee Alternative could substantially increase the extent of floodplain habitat potentially available to native fishes for rearing, this impact would be potentially beneficial.

### **AP Impact 3.8-c: Substantially Reduce Special-Status Fish Populations**

Overall, recent downward trends in fish populations appear to have reached alarmingly low levels. The Applicant Preferred Alternative – ASB Setback Levee Alternative could contribute to reversing this trend. The Applicant Preferred Alternative would be expected to have long-term fisheries benefits, because it would increase by approximately 1,300 acres the extent of floodplain habitat potentially available to native fishes for rearing. However, following periods when high flows pass through the levee setback area, receding floodwater could collect in existing ponds, channels and ditches, borrow areas, and other depressions. Fish that enter the floodway during higher flows, particularly juvenile chinook salmon and steelhead, could become stranded in these areas. Fish that are trapped in such depressions for long periods of time would experience high mortality rates as a result of lethal water temperatures, poor water quality, predation, or desiccation of these areas. Stranding could adversely affect populations of special-status fish species and result in a significant adverse effect. The numbers of fish that might be affected by stranding cannot be specifically quantified because the fish species and life stage (adult vs. juvenile) that might be present when floodwaters recede after a high water event cannot be determined. Special-status fish species only occur infrequently and intermittently in the project area (see description of special-status species above) and different species, life stages, and densities may be present as high water events occur during different months during the flood season. It would be purely conjecture to say that a particular number of individual fish would be adversely affected. Nevertheless, because the potential exists for project operation to directly result in mortality to individuals of a species listed or proposed for listing as threatened or endangered under the ESA, a significant adverse effect could occur.

#### **3.8.2.3 INTERMEDIATE SETBACK LEVEE ALTERNATIVE**

##### **ISL Impact 3.8-a/b/c: a) Potential Adverse Water Quality Effects on Special-Status Fish Species; b) Substantially Reduce the Quality and Quantity of Important Habitat for Special-Status Fish Species; c) Substantially Reduce Special-Status Fish Populations**

All impacts to fishery resources described above for the Applicant Preferred Alternative – ASB Setback Levee Alternative would also apply to the Intermediate Setback Levee Alternative. Impacts related to sediments, turbidity, and contaminants; loss of overhead cover and instream woody material; and potential borrow contaminants would be the same for the two alternatives. Adverse effects associated with fish stranding and potential beneficial effects associated with increased fish habitat would be less under the Intermediate Setback Levee Alternative due to the smaller size of the setback area (i.e., approximately 1,100 acres), although the inundation area during more frequent small scale flood events would be the same.

#### **3.8.2.4 LEVEE STRENGTHENING ALTERNATIVE**

The Levee Strengthening Alternative would not include a setback levee and associated floodway expansion, but rather results in a continuation of the existing levee configuration in the project area. Therefore, impacts described for the Applicant Preferred Alternative – ASB Setback Levee Alternative related to potential borrow material contaminants, fish stranding, and increased fish habitat would not occur under this alternative.

### **LS Impact 3.8-a: Potential Adverse Water Quality Effects on Special-Status Fish Species**

Repairing the existing left bank Feather River levee in Segment 2 would disturb soils along the top and water side of the existing levees. Any resulting erosion could temporarily increase turbidity and sedimentation downstream of the construction sites if soils are transported in river flows or stormwater runoff. Potential effects on special-status fish species from this turbidity and sedimentation would be the same as described above for the Applicant Preferred Alternative – ASB Setback Levee Alternative. For the reasons described above for the Applicant Preferred Alternative, attempting to quantify the effects of this impact on special-status fish species would be purely conjecture.

### **LS Impact 3.8-b: Substantially Reduce the Quality and Quantity of Important Habitat for Special-Status Fish Species**

No riparian habitat is located on the surface of the existing Feather River levee in the project area and no losses of riparian habitat are anticipated during the strengthening of the levee. However, small amounts of riparian vegetation (i.e., sporadic individual trees) that potentially provide overhead cover for fish or contributes instream woody material to the Feather River channel, may need to be removed or cleared from the waterside toe of the existing levee during the correction of identified erosion problem areas in project Segment 2. These trees only contribute to fishery habitat during high water events when the area near the toe of the existing levee is inundated. Removal of riparian vegetation adjacent to the existing levee or otherwise in the floodplain would be minor (i.e., sporadic individual trees) and temporary, and revegetation would occur over time. Effects on fish habitat would be negligible and no significant adverse effect would occur.

#### **3.8.2.5 NO-ACTION ALTERNATIVE**

If no permissions were granted to alter the existing levee or discharge dredged or fill material into waters of the United States, construction work necessary to completely repair the Segment 2 levee would not be allowed, and the only ground-disturbing activities or vegetation removal that might affect fish habitat would occur as part of normal levee maintenance activities. Under these conditions, heavy underseepage and loss of foundation soils would be expected to continue and the threat of another levee failure would remain. Under the No-Action Alternative, it is possible that localized levee repairs (e.g., correction of identified waterside erosion sites) could be authorized under the federal Clean Water Act (CWA) Nationwide Permit (NWP) #3. Any levee repair work that was implemented under NWP #3 could potentially involve construction activities that would require submittal of a Notice of Intent to the Central Valley Regional Water Quality Control Board and preparation of a Storm Water Pollution Prevention Plan. It is uncertain whether this work could potentially involve activities that would be subject to Section 1602 of the California Fish and Game Code.

If no action was taken to completely repair this deficient levee segment, a levee failure would likely lead to the displacement of fish into flooded areas and subsequent stranding and mortality. As described previously in Section 3.4.2 in the discussion of the No-Action Alternative, adverse water quality effects could result from releases of hazardous materials during a flood event, which could lead to direct mortality of various fish species. Emergency cleanup activities following a levee breach could cause the release of hazardous materials and contaminants (e.g., raw cement/ concrete or washings thereof, asphalt, paint or other coating material, oil or other petroleum products) into area waterways; high levels of suspended sediments would affect fish habitat and could increase the potential for mortality of special-status species.

#### **3.8.3 MITIGATION**

Mitigation measures for potential impacts to fisheries resources are based on consultation (formal and informal) and coordination with NMFS, USFWS, and DFG. The Corps and TRLIA and its representatives have participated in this consultation and coordination process. The consultation process considered site specific conditions and utilized accepted agency methods for assessing fishery impacts and providing mitigation measures typical for

California's Central Valley. In December 2007, NMFS provided a letter to the Corps determining that the Applicant Preferred Alternative – ASB Setback Levee Alternative is not likely to adversely affect species under their jurisdiction that might occur in the project area. NMFS also concluded that the Applicant Preferred Alternative would not adversely affect Essential Fish Habitat for Pacific salmon. Receipt of this letter concluded consultation for the Applicant Preferred Alternative – ASB Setback Levee Alternative (see Appendix H).

No mitigation measure is required for the following impact:

**Impact AP/ISL/LS 3.8-b: Substantially Reduce the Quality and Quantity of Important Habitat for Special-Status Fish Species**

The following mitigation measures would be applied to the **Applicant Preferred Alternative – ASB Setback Levee Alternative, Intermediate Setback Levee Alternative, and Levee Strengthening Alternative:**

**Mitigation Measure 3.8-a1: Implement Mitigation Measure 3.4-a, Prepare and Implement a Stormwater Pollution Prevention Plan**

To address potential fishery impacts related to sediment and turbidity, implement mitigation measures discussed in Section 3.4, “Water Quality,” for construction related water quality effects. This mitigation measure requires preparation of a Stormwater Pollution Prevention Plan (SWPPP) detailing measures to control soil erosion and waste discharges from construction areas and submittal of a Notice of Intent to the Central Valley Regional Water Quality Control Board (RWQCB) for stormwater discharges associated with general construction activity. The SWPPP must identify grading and erosion control best management practices and specifications to avoid and minimize water quality impacts to the extent practicable. See Section 3.4 for the complete mitigation measure.

**Mitigation Measure 3.8-a2: Implement Mitigation Measure 3.5-a1: Evaluation of Soils, Identification of Hazardous Materials, Disposition of Topsoil**

Mitigation for fishery impacts related to potential borrow material contaminants would be the same as mitigation for potential long term water quality effects discussed in Section 3.5, “Hazardous Materials.” This mitigation measure requires TRLIA or its primary construction contractor to have a qualified hazardous materials specialist conduct on-site field screening of soil samples from the existing levee sections that would be used to fill borrow sites in the setback area. These soil samples will be visually screened for potential contamination at all depths. Field testing will be used to test for contaminants. If a qualified specialist determines that additional testing is necessary, laboratory analytical testing of soil samples may be performed. Material that is deemed unsuitable for use in the setback area floodplain will be hauled to an appropriate location outside of the setback area and/or made available for other approved uses. Topsoil that is stripped from borrow areas east of the setback levee will not be used to construct the setback levee. See Section 3.5 for the complete mitigation measure.

**Mitigation Measure 3.8-c1: Comply with Conditions of Streambed Alteration Agreement**

TRLIA shall comply with conditions set forth to protect streambed resources and fish and wildlife habitat in the streambed alteration agreement received from DFG (the agreement is duplicated in Appendix G, “California Department of Fish and Game, Permit Applications”). Conditions include requirements to record and report impacts on riparian vegetation and provision of replacement habitat if habitat removal occurs.

The following mitigation measures would be applied to the **Applicant Preferred Alternative – ASB Setback Levee Alternative and Intermediate Setback Levee Alternative.**

**Mitigation Measure 3.8-c2: Comply with Conditions Set Forth in the Biological Assessments (BAs) Prepared for USFWS and NMFS and the USFWS Biological Opinion (BO) as Part of the ESA Section 7 Consultation Process.**

TRLIA shall comply with conditions set forth in the BAs prepared for USFWS and NMFS as part of the ESA Section 7 consultation process. These BAs are duplicated in Appendix H, “Correspondence Regarding Special-Status Species.” NMFS has provided a letter concurring that if measures included in the BA are implemented, the Applicant Preferred Alternative – ASB Setback Levee Alternative is not likely to adversely affect fisheries resources under the jurisdiction of the USFWS. This letter is provided in Appendix H. Formal consultation with USFWS has been completed. As described in Section 3.7, “Terrestrial Biological Resources,” additional conditions provided by USFWS as part of the final biological opinion (BO) are being implemented.

The following measures either duplicate or support those found in the BAs and the BO. TRLIA is already legally committed to implementing these measures through the CEQA EIR process.

To address potential fish stranding issues, TRLIA and its primary contractors for engineering design and construction shall ensure that the following measures are implemented to minimize the potential for fish stranding in the levee setback area:

- (a) Plan and implement drainage improvements. TRLIA or its designated construction contractors, through a combination of grading and drainage improvements, shall minimize the potential for floodwater to pond in the levee setback area in such a way that substantial numbers of fish become stranded and consequently become exposed to hostile environments (warm water temperatures and increased predation).

As part of the development of the final design for the levee setback area, TRLIA or its representatives shall determine the specific topographic and hydrologic characteristics of the levee setback area and shall define the anticipated flooding regime (depth, duration, and extent of flooding), drainage patterns, and potential for fish stranding risks there. The final project design shall include recontouring as necessary to ensure complete drainage and provide fish passage back to the main river channel as flood flows recede from the levee setback area. Features with substantial stranding risk shall be identified for filling and/or grading.

Complete drainage is important to reduce the risk of stranding; however, maintaining some seasonal aquatic habitat in the levee setback area and/or hydrologic connectivity to the Feather River may also be important features if enhancement of fish habitat and production is selected as a management activity in the levee setback area.

Before the design of the levee setback area is finalized, TRLIA or its representatives shall obtain the approval of DFG and NMFS indicating that the planned drainage and grading features are sufficient to address concerns about fish stranding potential. The features of the levee setback area shall be constructed in accordance with the approved final design.

- (b) Monitor the success of the drainage features and adjust if necessary. A mitigation monitoring plan shall be developed and implemented by a qualified biologist on behalf of TRLIA and shall be approved by DFG and NMFS before degradation of the existing levee. This monitoring plan shall evaluate the effectiveness of the grading and drainage features in the levee setback area in reducing the risk of fish stranding and the stability of the drainage features and shall determine the need for maintenance or modification. The monitoring plan shall include provisions for remediation should the design of the levee setback area prove to be unsuccessful in preventing fish stranding. These measures shall include, as appropriate, such activities as regrading or filling depressions in the levee setback area.

The recommended monitoring scheme shall include annual monitoring for a period of 5 years following the removal of any part of the existing levee. Additional monitoring may be required for areas where remediation is necessary. Monitoring is recommended to include the following actions:

- ▶ Visual assessment of the levee setback area by a qualified biologist before the flood season (i.e., by October 31). This assessment should note any substantial changes in the overall structure since implementation of the final design for the area, including reestablishment of vegetation and the presence of “holes” or pits.
- ▶ A visual survey by a qualified biologist at the end of each event that floods the levee setback area (i.e., after the recession of waters that inundate the floodplain). This survey should identify whether there is any ponding that would result in fish stranding, or whether channels have formed that flow through completely to the low-flow channel of the Feather River.

Following each flood season (i.e., after April 16), a letter report shall be submitted to NMFS and DFG summarizing the overall condition of the floodplain area and any changes that have occurred from the previous year(s). If any remediation measures are required, they shall be outlined in the letter report, along with a schedule specifying when the remediation activities will occur. Appropriate remediation measures shall be implemented as soon as is practicable to minimize the potential for fish stranding while maintaining the desired habitat values (if habitat enhancement is included in the floodplain area) and hydraulic characteristics of the area.

The performance of the mitigation measure shall be considered successful if there is no isolated standing water and/or barriers to fish passage capable of resulting in substantial fish stranding following a flood event that inundates the levee setback area.

Implementation of planned floodplain drainage features would also provide enhanced habitat conditions for special-status fish species. Studies of the potential geomorphic effects of the Applicant Preferred Alternative – ASB Setback Levee Alternative floodplain drainage swale (which would also be incorporated into the Intermediate Setback Levee Alternative) have included modeling of minor high water events (e.g., 1-in-2 year flood event, 1-in-5 year flood event) that would result in limited inundation of portions of the levee setback area. In these circumstances, the water surface elevation in the Feather River increases sufficiently to cause floodwaters to “back up” into the proposed floodplain drainage swale (Phillip Williams & Associates 2008b). The modeled water surface elevation in the Feather River at the location of the drainage swale is within approximately 1 foot of inundating a substantial amount of the new floodplain. Modeling results show that for a modest highwater event (7,373 cfs), waters from the Feather River would discharge into the floodplain swale and other low-gradient ditches for up to 1.5 miles, thereby inundating approximately 30 acres and providing floodplain habitat for various fish species. A slightly larger estimated discharge event (8,414 cfs) would discharge into the floodplain swale for a similar distance, but it would inundate approximately 74 acres. These are general approximations, however, both estimates highlight the potential for removal of the existing levee and enhancement of the drainage swale to allow for re-creation of natural floodplain processes and related micro-habitat conditions in the lower part of the levee setback area.

## 3.9 SPECIAL-STATUS BIOLOGICAL RESOURCES

This section evaluates the direct effects of the Applicant Preferred Alternative – Above Star Bend (ASB) Setback Levee Alternative (also referred to as the “Applicant Preferred Alternative”) and other alternatives on special-status species, including terrestrial and aquatic species. This section compiles and reiterates special-status species information from Section 3.7, “Terrestrial Biological Resources,” and Section 3.8, “Fisheries.” The effects of the Applicant Preferred Alternative and other alternatives on waters of the United States (U.S.), including wetlands, are separately addressed in Section 3.6, “Waters of the United States and Wetlands.” Potential indirect effects of the Applicant Preferred Alternative and other alternatives are addressed in Chapter 4.0, “Cumulative and Growth-Inducing Effects.” For example, for an evaluation of the effects to Swainson’s hawk nesting and foraging habitat from development potentially facilitated by the Applicant Preferred Alternative and other action alternatives, see Section 4.1.2.6, “Biological Resources.” For an evaluation of the combined beneficial effects related to increasing the complexity of sensitive habitats available to species, including special-status species, from implementation of past, present, and future flood control projects in the region that include a habitat enhancement component (e.g., the Bear River Setback Levee Project), see Section 4.2.3.4, “Ecosystem and Habitat Restoration Efforts,” and Section 4.2.4.5, “Terrestrial Biological Resources.”

### 3.9.1 EXISTING CONDITIONS

For the purposes of this analysis, special-status species are plants and animals (including fish) that are legally protected or that are otherwise considered sensitive by federal conservation agencies, including:

- ▶ plant and wildlife species that are listed by the federal Endangered Species Act (ESA) as rare, threatened, or endangered;
- ▶ plant and wildlife species considered candidates for listing or proposed for listing under the ESA; and
- ▶ fish and wildlife species identified by U.S. Fish and Wildlife Service (USFWS) or National Marine Fisheries Service (NMFS) as species of concern.

In addition, plant species considered rare, threatened, or endangered in the California Native Plant Society’s (CNPS’s) *Inventory of Rare and Endangered Vascular Plants of California* (California Native Plant Society 2006) are also considered in this EIS. CNPS is a scientific organization with special expertise in California. CNPS listed plant species are considered a corollary to wildlife species identified by the USFWS as species of concern.

The California Natural Diversity Database (CNDDDB) was used as the primary source to identify previously reported occurrences of special-status species in the project vicinity (California Natural Diversity Database 2007). Although the CNDDDB is the most current and reliable tool for tracking occurrences of special-status species, it contains only those records that have been reported to the California Department of Fish and Game (DFG). To identify additional special-status plant species with potential to occur in the project area, a search of the online edition of CNPS’s *Inventory of Rare and Endangered Vascular Plants of California* (California Native Plant Society 2006) was also conducted. Other sources include both published and unpublished data and reports and observations made during plant and wildlife surveys conducted for the FRLRP.

The descriptions of species presence are also based on observations made during field surveys conducted in 2006, 2007, and 2008 and information previously presented in the Y-FSFCP programmatic environmental impact report (EIR) (Yuba County Water Agency 2003a) and the Feather River Levee Repair Project (FRLRP) EIR (TRLIA 2006b).

Biological resource surveys were conducted in 2007 and 2008 on potential borrow sites along the east side of the proposed setback levee north of Anderson Avenue and on a site located on Ella Road approximately 1 mile east of the north end of the setback levee alignment. No special-status species were observed within these sites.



### 3.9.1.1 SPECIAL-STATUS PLANT SPECIES

Two special-status plant species are documented in the CNDDDB and CNPS Inventory as occurring in the project vicinity: Rose mallow (*Hibiscus lasiocarpus*) and Wright's trichocoronis (*Trichocoronis wrightii* var. *wrightii*). Information regarding these species is provided in Table 3.9-1. Other species recorded in the region are not expected to occur at the project site because they are restricted to habitats that are not present in the project area, such as vernal pools, meadows, grasslands, and cismontane woodlands. (See Section 3.7, "Terrestrial Biological Resources," for a discussion of habitat types in the project area.).

| <b>Table 3.9-1<br/>Special-Status Plant Species with Potential to Occur in the Project Vicinity</b> |                      |                                                                                             |                                                                                                                                                    |                  |                                                                                                                                               |
|-----------------------------------------------------------------------------------------------------|----------------------|---------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Species                                                                                             | Listing Status USFWS | Habitat                                                                                     | Distribution                                                                                                                                       | Flowering Period | Potential for Occurrence in the Project Study Area                                                                                            |
| Rose mallow<br><i>Hibiscus lasiocarpus</i>                                                          | -                    | Marshes and swamps (freshwater); 0–120 meters elevation                                     | Butte, Contra Costa, Colusa, Glenn, Sacramento, San Joaquin, Solano, Sutter, and Yolo Counties, widespread outside of California                   | June–September   | Approximately 10–20 acres of suitable habitat in the project study area, but species not found during focused surveys. Not expected to occur. |
| Wright's trichocoronis<br><i>Trichocoronis wrightii</i> var. <i>wrightii</i>                        | -                    | Meadows, marshes and swamps, riparian forest, vernal pools/alkaline; 5–435 meters elevation | Extant in Merced and Riverside Counties and in Texas, and widespread outside of California; extirpated in Colusa, San Joaquin, and Sutter Counties | May–September    | Approximately 50–60 acres of suitable habitat in the project study area, but species not found during focused surveys. Not expected to occur. |

#### Rose Mallow

Rose mallow is a CNPS List 2 plant (plants considered rare, threatened, or endangered in California but more common elsewhere). It is an emergent perennial herb in the mallow family that produces large pink flowers. It blooms from June to September and grows in freshwater marshes and swamps. Suitable habitat for rose mallow exists in the proposed levee setback area in Segment 2 and includes areas of freshwater marsh within drainage/irrigation canals and ditches. Approximately 10–20 acres of suitable habitat occurs in the project study area.

#### Wright's Trichocoronis

Wright's trichocoronis is also a CNPS List 2 plant. An annual herb in the sunflower family, it produces small whitish flowers from May to September and grows in meadows, marshes and swamps, riparian forest, and vernal pools. Suitable habitat for Wright's trichocoronis is provided by freshwater marsh in the drainage/irrigation canals and ditches in the proposed levee setback area in Segment 2, in moist riparian habitats bordering drainage/irrigation canals and ditches, and within the Feather River floodway. Approximately 50–60 acres of suitable habitat occurs in the project study area.

In July 2007, EDAW botanists conducted a rare plant survey targeting potential occurrences of rose mallow and Wright's trichocoronis that could be disturbed as a result of project implementation. In summary, no populations of these special-status species were identified during the survey. Therefore, although suitable habitat for these species occurs at the project site, they are not expected to occur and are not addressed further.

### **3.9.1.2 SPECIAL-STATUS TERRESTRIAL WILDLIFE SPECIES**

Based on previously existing information and observations made during field surveys, a total of seven special-status terrestrial wildlife species have potential to occur in the project vicinity. The regulatory status, habitat associations, and potential for these species to occur in the project area are summarized in Table 3.9-2. Additional special-status animal species are known to occur in the region. However, based on the field surveys and assessment of database records, these species are not expected to occur at the project site and were eliminated from further analysis because no suitable habitat occurs in the project area, the species have not been documented in the project vicinity despite numerous biological surveys, and/or the species have very restricted ranges that do not include the project study area.

Two of the special-status wildlife species with potential to occur in the project area are federally listed as threatened: valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) and giant garter snake (*Thamnophis gigas*). Western yellow-billed cuckoo (*Coccyzus americanus occidentalis*) is a candidate for listing under the ESA. The remaining species are considered species of concern by USFWS. These species are discussed further below.

#### **Valley Elderberry Longhorn Beetle**

The valley elderberry longhorn beetle is federally listed as threatened. This beetle is generally found in riparian habitats and requires blue elderberry shrubs for survival and reproduction. Valley elderberry longhorn beetle has been documented at the Bobelaine Audubon Sanctuary, located on the west (Sutter County) side of the Feather River, 12 miles south of Yuba City (California Natural Diversity Database 2007). Field surveys conducted for the project in 2007 resulted in identification of elderberry shrubs in the Segment 2 project area, which are depicted in Figures 3.9-1a and 3.9-1b. Over 150 elderberry shrubs or shrub clumps have been mapped in the project area. All elderberry shrubs with stems 1 inch or greater in diameter within the range of the valley elderberry longhorn beetle are considered potential habitat for this threatened species.

#### **Northwestern Pond Turtle**

The northwestern pond turtle is a federal Species of Concern. The northwestern pond turtle has been documented along the Feather River in the Bobelaine Audubon Sanctuary. Suitable basking and nesting habitat for this species exists within portions of the Feather River floodway. Approximately 15–20 acres of potential habitat for northwestern pond turtle occurs in the project area.

#### **Giant Garter Snake**

Giant garter snake is federally listed as threatened. Giant garter snakes inhabit a variety of aquatic habitats, such as agricultural canals, marshes, sloughs, and ponds. Giant garter snakes also require adjacent upland habitat (for basking) and burrows (for over wintering) that provide sufficient cover and are at high enough elevations to function as refuges from floodwaters during the snakes' inactive season (early fall to early spring). A historical population was documented in the project region, east of State Route (SR) 70 near the Bear River approximately 3 miles upstream of the confluence with the Feather River. Despite the lack of recent records of giant garter snake in the project vicinity, aquatic habitats in the area could support giant garter snakes because they are hydrologically connected to areas capable of supporting the species. The rice fields and accompanying irrigation system, which existed prior to the extensive residential development west of SR 70 and north of Feather River

**Table 3.9-2  
Special-Status Wildlife Species with Potential to Occur in the Project Vicinity**

| Species                                                                                                                                                                               | Listing<br>Status<br>USFWS | Habitat                                                                                                                                                               | Potential for Occurrence<br>on the Project Site                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Valley elderberry<br>longhorn beetle<br><i>Desmocerus<br/>californicus dimorphus</i>                                                                                                  | T                          | Elderberry shrubs, typically within<br>riparian habitat.                                                                                                              | May occur on-site. Valley elderberry longhorn<br>beetles have been documented in the project<br>vicinity (California Natural Diversity Database<br>2007). Elderberry shrubs grow in the Feather<br>River floodway and in the proposed levee<br>setback area in project Segment 2.<br>Approximately 135 total shrubs in the project<br>study area.                                    |
| Northwestern pond<br>turtle <i>Emys marmorata<br/>marmorata</i>                                                                                                                       | FSC                        | Requires some slack- or slow-water<br>aquatic habitat; prefers habitats with<br>prevalence of basking sites.                                                          | Pond turtles are known to occur in the project<br>vicinity (California Natural Diversity Database<br>2007). Suitable habitat is available in the<br>Feather River floodway and in irrigation/<br>drainage ditches and canals in the proposed<br>levee setback area in project Segment 2.<br>Approximately 15–20 total acres of potential<br>habitat occur in the project study area. |
| Giant garter snake<br><i>Thamnophis gigas</i>                                                                                                                                         | T                          | Open water associated with<br>marshes, sloughs, and irrigation/<br>drainage ditches within the Central<br>Valley; requires developed wetland<br>vegetation for cover. | Low potential but possible within the Plumas<br>Lake Canal and other irrigation/drainage ditches<br>in the proposed levee setback area in<br>Segment 2. Approximately 16.9 acres of<br>suitable aquatic habitat and 11 acres of suitable<br>upland habitat occur in the project study area.                                                                                          |
| Western yellow-billed<br>cuckoo<br><i>Coccyzus americanus<br/>occidentalis</i>                                                                                                        | C                          | Generally occurs in dense riparian<br>habitats.                                                                                                                       | May nest within the Feather River floodway.<br>However, no potential habitat to be affected by<br>project activities.                                                                                                                                                                                                                                                                |
| Loggerhead shrike<br><i>Lanius ludovicianus</i>                                                                                                                                       | FSC                        | Forages in grasslands and<br>agricultural fields; nests in scattered<br>shrubs and trees.                                                                             | May nest in trees and shrubs in the proposed<br>levee setback area, and in the Feather River<br>floodway. Approximately 76.0 acres of<br>potential nesting habitat occurs in the project<br>study area. Suitable foraging habitat present<br>throughout the project study area.                                                                                                      |
| Tricolored blackbird<br><i>Agelaius tricolor</i>                                                                                                                                      | FSC                        | Forages in grasslands and<br>agricultural fields; nests in<br>freshwater marsh with dense cattails<br>and tules, riparian scrub, and other<br>dense shrubs and herbs. | Potential nesting habitat is of marginal quality;<br>however, could nest in riparian scrub and<br>freshwater marsh within the Feather River<br>floodway and proposed levee setback areas in<br>Segment 2. Approximately 76.0 acres of<br>potential nesting habitat occurs in the project<br>study area. Suitable foraging habitat present<br>throughout the project study area.      |
| Pacific western big-<br>eared bat<br><i>Corynorhinus<br/>townsendii townsendii</i>                                                                                                    | FSC                        | Hibernates in caves, mines, and on<br>old buildings. May roost at night in<br>tree cavities. Forages in a variety of<br>upland habitats.                              | May roost in snags in the riparian woodland<br>within the Feather River floodway. Due to<br>specific micro-habitat requirements, acreage of<br>roosting habitat cannot be estimated. Suitable<br>foraging habitat present throughout the project<br>study area.                                                                                                                      |
| U.S. Fish and Wildlife Service (USFWS) Federal Listing Categories:<br>T        Federally listed as threatened<br>C        Candidate for listing<br>FSC     Federal Species of Concern |                            |                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                      |

Boulevard, provided habitat and transit corridors for giant garter snakes that may have occupied the region historically. The Plumas Lake Canal is a historical feature capable of sustaining giant garter snakes, and it may support remnant populations of the species. Most upland habitat in the project vicinity is dominated by agricultural lands; these areas are incompatible with the biological needs of giant garter snake because routine maintenance eliminates belowground refuge. Therefore, undisturbed uplands and potential over wintering habitat is limited to bank margins of the aquatic habitat. Field surveys conducted for the project in 2007 resulted in mapping of suitable aquatic and upland habitats. Figure 3.9-2 shows the habitat areas, which include approximately 16.9 acres of aquatic habitat and approximately 11 acres of upland habitat. There is no suitable giant garter snake habitat in the project area north of Anderson Avenue.

### **Tricolored Blackbird**

Tricolored blackbird (*Agelaius tricolor*) is a federal Species of Concern. Tricolored blackbirds nest colonially and prefer dense cattail patches, but they also utilize blackberry and other patches of dense vegetation. They forage in grasslands and agricultural fields. The nearest tricolored blackbird colonies documented during statewide surveys conducted in 2005 were at Beale Air Force Base, approximately 10 miles east of the project area (USFWS data). There are no records of historic colonies within approximately 2 miles of the project area (California Natural Diversity Database 2007). Despite the lack of known nearby colonies, freshwater marsh and riparian scrub habitats within the project study area could support a nesting colony in the future. Approximately 76.0 acres of potential nesting habitat occurs in the project study area. In addition, small flocks of tricolored blackbirds were observed flying over the project area during 2006 surveys and could forage in agricultural fields and other open habitats in the study area.

### **Western Yellow-Billed Cuckoo**

Western yellow-billed cuckoo is a candidate for federal listing as threatened or endangered. This species requires relatively large wide patches of cottonwood-willow riparian forests. Potentially suitable habitat for yellow-billed cuckoo exists within the Feather River floodway in the southern portion of Segment 2. However, none of the suitable habitat in the floodway would be directly affected by the Applicant Preferred Alternative – ASB Setback Levee Alternative or other alternatives. Western yellow-billed cuckoo has been documented at the Bobelaine Audubon Sanctuary and in the vicinity of the confluence of the Feather and Yuba Rivers (California Natural Diversity Database 2007).

### **Loggerhead Shrike**

Loggerhead shrike (*Lanius ludovicianus*) is a federal Species of Concern. Shrikes inhabit lowland and foothill areas with scattered shrubs and trees. Loggerhead shrikes nest in shrubs and small trees and typically forage in grasslands and agricultural fields. Approximately 76.0 acres of potential nesting habitat occurs in the project study area. Suitable foraging habitat exists throughout the project area.

### **Pacific Western Big-Eared Bat**

Pacific western big-eared bat (*Corynorhinus townsendii townsendii*) is a federal Species of Concern. This species generally hibernates in caves, mines, or old buildings but may roost in tree cavities. There are no natural and very few potential artificial roosting locations in the project area on the land side of the existing levees. However, snags in the riparian woodland in the Feather River floodway could provide roosting habitat for small numbers of individuals. There are no CNDDDB records of past colonies in or near the project area. Given the limited micro-habitat types used by this species for roosting, a specific acreage of suitable roosting habitat in the project area cannot be calculated. Suitable foraging habitat is present throughout the project study area.

### 3.9.1.3 SPECIAL-STATUS FISH SPECIES

A total of seven special-status fish species have the potential to occur in the lower Feather River, as described below. Of the seven species, green sturgeon, Central Valley steelhead Evolutionarily Significant Unit (ESU), Sacramento River winter-run chinook salmon ESU, Central Valley spring-run chinook salmon ESU, and Central Valley fall/late fall-run chinook salmon are federally listed as threatened or endangered species. The Central Valley fall/late fall-run chinook salmon ESU and Pacific lamprey are identified by the NMFS as species of special concern. USFWS delisted Sacramento splittail from its threatened status on September 22, 2003. Brief descriptions follow for the special-status species with potential to occur in the lower Feather River (Table 3.9-3).

Oroville Dam is the upstream limit of anadromous fish migration in the Feather River. Most of the water released from Oroville Reservoir is diverted at Thermalito Diversion Dam into the Thermalito Complex. During controlled releases, water is released at a constant rate of 600 cubic feet per second through the Fish Barrier Dam to the Feather River Fish Hatchery and then into the low-flow section of the Feather River. This 8-mile reach, which extends downstream to the Thermalito Afterbay outlet, provides important spawning and rearing habitat for spring-run chinook salmon and steelhead. 14 miles of additional spawning and rearing habitat exists between the Thermalito Afterbay outlet and the mouth of Honcut Creek, which is located upstream of the project area (see Figure 1-2).

#### Green Sturgeon

Green sturgeon (*Acipenser medirostris*) is listed as threatened by NMFS (71 *Federal Register* [FR] 17757, April 7, 2006). Green sturgeon occurs in the lower reaches of large rivers, including the Sacramento and San Joaquin River basins, and in the Eel, Mad, Klamath, and Smith Rivers. Green sturgeon is found primarily in the Sacramento River and occasionally in the lower Feather River. Green sturgeon adults and juveniles occur throughout the upper Sacramento River, based upon observations incidental to winter-run chinook monitoring at the Red Bluff Diversion Dam in Tehama County (National Marine Fisheries Service 2005). Green sturgeon spawn predominantly in the upper Sacramento River. They are thought to spawn every 3–5 years (Tracy 1990). Their spawning period is March to July, with a peak from mid-April to mid-June (Moyle, Foley, and Yoshiyama 1992). Juveniles inhabit the Bay-Delta estuary until they are approximately 4–6 years old, when they migrate to the ocean (Kohlhorst et al. 1991). Green sturgeon have historically been present in the Feather River. Reproduction is not likely to take place within the Feather River, but rather in the Sacramento River. However, green sturgeon are consistently documented within the Feather River and are known to be present in the Yuba River, which enters the Feather River immediately upstream of the project area. Therefore, individuals must pass through the project area during migrations to and from the Yuba River and upstream areas of the Feather River.

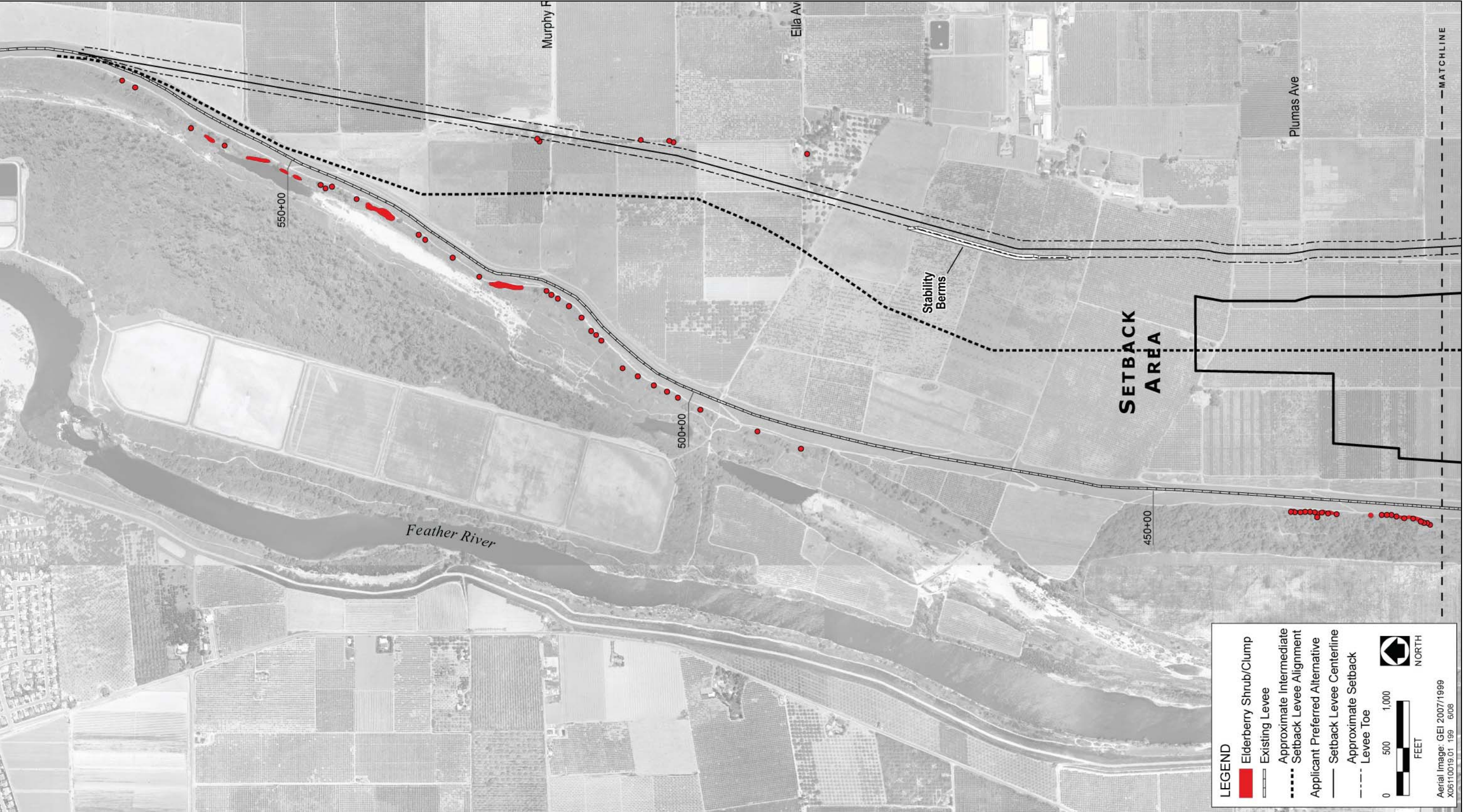
#### Pacific Lamprey

Pacific lamprey is a NMFS species of special concern. Similar to chinook salmon and steelhead (described below), Pacific lamprey (*Lampetra tridentata*) adults migrate upstream from the ocean during the winter and spring to spawn (Moyle 2002). Spawning occurs over gravel substrates. Larval lamprey rear in sand and mud substrates, gradually moving downstream over the rearing period. Little is known about their habitat needs or population trends. Adult Pacific lamprey would only be found in the Feather River in the vicinity of the FRLRP project site as they pass through the area during spawning migrations. Juvenile lamprey would pass through the area as they gradually move downstream to the ocean.

#### Central Valley Steelhead

Historically, Central Valley steelhead (*Oncorhynchus mykiss*) spawned and reared in most of the accessible upstream reaches of Central Valley rivers, including the Yuba, Feather, and Sacramento Rivers and their perennial tributaries. Steelhead generally migrated farther than chinook salmon (described below) into tributaries and headwater streams where cool, well-oxygenated water is available year round.



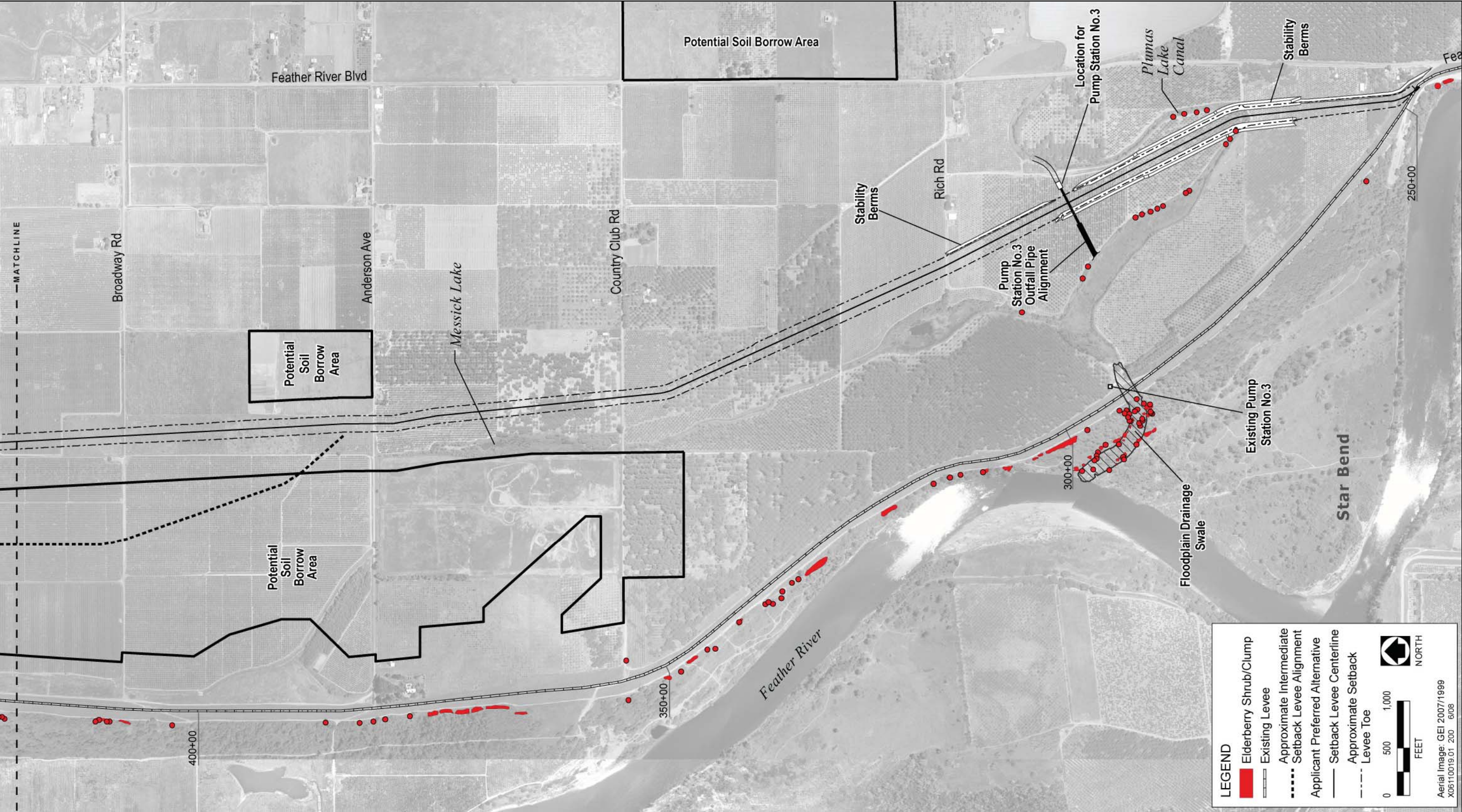


Source: USFWS Biological Assessment, see Appendix H

Locations of Elderberry Shrubs in the Study Area

Figure 3.9-1a



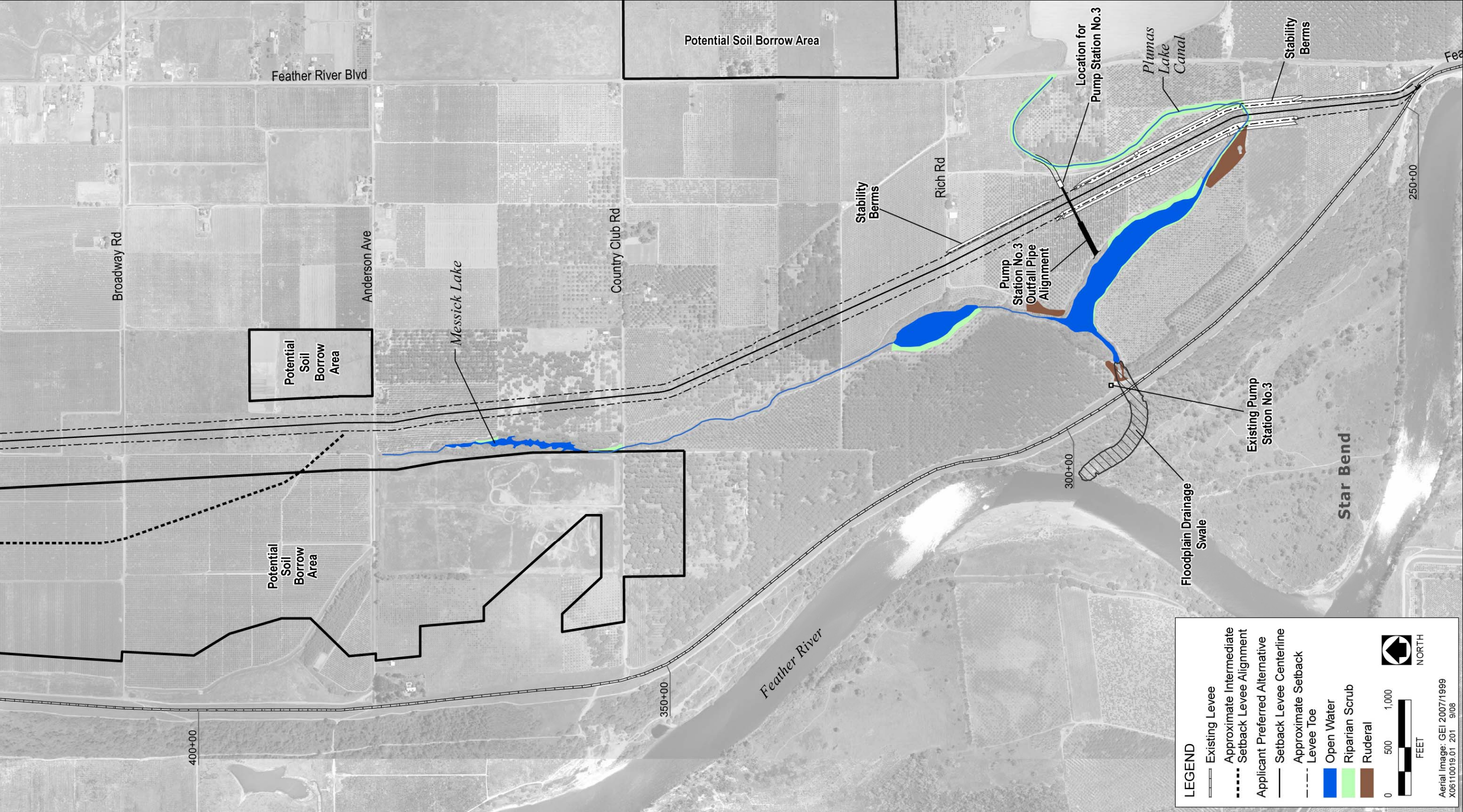


Source: USFWS Biological Assessment, see Appendix H

Locations of Elderberry Shrubs in the Study Area

Figure 3.9-1b





Source: USFWS Biological Assessment, see Appendix H

Suitable Giant Garter Snake Habitat in the Study Area

Figure 3.9-2



**Table 3.9-3  
Special-Status Fish Species Potentially Occurring in the Lower Feather and Yuba Rivers**

| Species                                                                                                                                                                                                                              | Status <sup>1</sup><br>USFWS/<br>NMFS | Habitat                                                                                                                                                                                                        | Potential to Occur in the<br>Lower Feather River                                                                                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| Green sturgeon<br><i>Acipenser medirostris</i>                                                                                                                                                                                       | T                                     | Requires cold, freshwater streams with suitable gravel for spawning; rears seasonally inundated floodplains, rivers, tributaries, and Delta                                                                    | Occurs in the lower Feather River                                                                                                                     |
| Pacific lamprey<br><i>Lampetra tridentada</i>                                                                                                                                                                                        | SSC                                   | Requires cool, freshwater streams with suitable gravel for spawning                                                                                                                                            | Occurs in the lower Feather River                                                                                                                     |
| Central Valley steelhead<br>ESU<br><i>Oncorhynchus mykiss</i>                                                                                                                                                                        | T                                     | Requires cold, freshwater streams with suitable gravel for spawning; rears in seasonally inundated floodplains, rivers, and tributaries, and in the Delta                                                      | Occurs in the lower Feather River                                                                                                                     |
| Sacramento River winter-run chinook salmon ESU<br><i>Oncorhynchus tshawytscha</i>                                                                                                                                                    | E                                     | Requires cold, freshwater streams with suitable gravel for spawning; rears in seasonally inundated floodplains, rivers, and tributaries, and in the Delta                                                      | Occurs in the Sacramento River and tributaries; adults and juveniles may stray into the Feather River; unlikely to occur adjacent to the project site |
| Central Valley spring-run chinook salmon ESU<br><i>Oncorhynchus tshawytscha</i>                                                                                                                                                      | T                                     | Requires cold, freshwater streams with suitable gravel for spawning; rears in seasonally inundated floodplains, rivers, and tributaries, and in the Delta                                                      | Occurs in the lower Feather River                                                                                                                     |
| Central Valley fall/late fall-run chinook salmon<br><i>Oncorhynchus tshawytscha</i>                                                                                                                                                  | SSC                                   | Requires cold, freshwater streams with suitable gravel for spawning; rears in seasonally inundated floodplains, rivers, and tributaries, and in the Delta                                                      | Occurs in the lower Feather and Yuba Rivers                                                                                                           |
| Sacramento splittail<br><i>Pogonichthys macrolepidotus</i>                                                                                                                                                                           | DT                                    | Spawning and juvenile rearing from winter to early summer in shallow weedy areas inundated during seasonal flooding in the lower reaches and flood bypasses of the Sacramento River, including the Yolo Bypass | Occurs in the lower Feather River                                                                                                                     |
| Notes: ESU = Evolutionarily Significant Unit; NMFS = National Marine Fisheries Service; USFWS = U.S. Fish and Wildlife Service                                                                                                       |                                       |                                                                                                                                                                                                                |                                                                                                                                                       |
| <sup>1</sup> Legal Status Definitions<br>Federal Listing Categories (USFWS and NMFS)<br>E Endangered (legally protected)<br>T Threatened (legally protected)<br>DT Delisted from threatened status<br>SSC Species of Special Concern |                                       |                                                                                                                                                                                                                |                                                                                                                                                       |
| Source: Data compiled by EDAW in 2007 from the California Natural Diversity Database (2007), past environmental impact reports addressing the project area, and sources cited in this section                                        |                                       |                                                                                                                                                                                                                |                                                                                                                                                       |

In the Central Valley, steelhead are now restricted to the upper Sacramento River downstream of Keswick Reservoir; the lower reaches of large tributaries downstream of impassable dams; small, perennial tributaries of the Sacramento River mainstem and large tributaries; and the Bay-Delta system.

Population estimates of steelhead on the Feather River have not been performed; however, since 1967 an average of approximately 900 steelhead has returned each year to the Feather River Fish Hatchery (California Department of Fish and Game 2006).

The upstream migration of adult steelhead in the mainstem Sacramento River historically started in July, peaked in September, and continued through February or March. Central Valley steelhead spawn mainly from January

through March, but spawning has been reported from late December through April (McEwan and Jackson 1996). During spawning, the female digs a redd (gravel nest) in which she deposits her eggs, which are then fertilized by the male. Egg incubation time in the gravel is determined by water temperature, varying from approximately 19 days at an average water temperature of 15.5°C to approximately 80 days at an average temperature of 14.5°C (McEwan and Jackson 1996).

Steelhead fry usually emerge from the gravel 2–8 weeks after hatching (Barnhart 1986, Reynolds et al. 1993), between February and May, sometimes extending into June (California Department of Fish and Game 1991). Newly emerged steelhead fry move to shallow, protected areas along streambanks but move to faster, deeper areas of the river as they grow. Juvenile steelhead feed on a variety of aquatic and terrestrial insects and other small invertebrates.

Juvenile steelhead rear throughout the year and may spend 1–3 years in fresh water before emigrating to the ocean. Smoltification, the physiological adaptation that juvenile salmonids undergo to tolerate saline waters, occurs in juveniles as they begin their downstream migration. Smolting steelhead generally emigrate from March to June (California Department of Fish and Game 1991).

NMFS completed a status review of steelhead populations in Washington, Oregon, Idaho, and California, and identified 15 ESUs in this range. On August 9, 1996, NMFS issued a proposed rule to list five of these ESUs (including the Central Valley steelhead) as endangered under ESA, and five as threatened (61 *Federal Register* [FR] 155). The Central Valley steelhead ESU was later listed as threatened (downgraded from its proposed status of endangered) (63 FR 13347, March 19, 1998), and critical habitat (which included the lower Feather and Yuba Rivers) was designated for this ESU (65 FR 7764, February 16, 2000). However, following a lawsuit (*National Association of Home Builders et al. v. Donald L. Evans, Secretary of Commerce, et al.*) (see “Central Valley Spring-Run chinook Salmon” below), NMFS rescinded the listing. After further review, critical habitat for the Central Valley steelhead ESU was designated on August 12, 2005. Critical habitat is designated to include select waters in the Sacramento and San Joaquin River basins, including the Feather River.

The Feather River in the vicinity of the FRLRP project site does not provide spawning habitat for Central Valley steelhead, although adults pass through the area as they migrate to spawning sites upstream. While rearing, juvenile steelhead may spend a more extended period in the vicinity of the FRLRP project site.

### **Sacramento River Winter-Run Chinook Salmon**

The Sacramento River winter-run chinook salmon (*Oncorhynchus tshawytscha*) ESU is listed as endangered by NMFS. Sacramento River winter-run chinook salmon do not spawn in the Feather River, but juveniles may periodically move into the lower portions of the river from the Sacramento River during downstream migration. Therefore, if Sacramento River winter-run chinook salmon occur in the Feather River in the vicinity of the FRLRP project site, it would only be juveniles and only intermittently for short periods.

Juvenile winter-run chinook salmon rear and emigrate in the Sacramento River from July through March (Hallock and Fisher 1985). Juveniles descending the Sacramento River above Red Bluff Diversion Dam (RBDD) from August through October, and possibly November, are mostly presmolts (smolts are juveniles that are physiologically ready to enter seawater) and probably rear in the Sacramento River below RBDD. Juveniles have been observed in the Delta from October through December, especially during high Sacramento River discharges caused by late fall and early winter storms.

Cover structures, space, and food are necessary components of rearing habitat for all races of chinook salmon. Suitable habitat includes areas with instream and overhead cover in the form of undercut banks; downed trees; and large, overhanging tree branches. The organic materials forming fish cover also help provide sources of food, in the form of both aquatic and terrestrial insects. Growth of juvenile chinook salmon in floodplain habitat is fast relative to growth in river habitat. Juvenile salmon have been found to have growth rates in excess of 1 millimeter (mm) per day when they rear in flooded habitat and as much as 20 mm in 2–3 weeks (U.S. Army Corps of

Engineers 2001). The water temperature is typically higher in floodplain habitat than in main channel habitats. Although increased temperature increases metabolic requirements, the productivity in flooded habitat is also increased, resulting in higher growth rates (Sommer et al. 2001). The production of drift invertebrates in the Yolo Bypass has been found to be one to two times greater than in the river (Sommer et al. 2001). Also, grasses that are flooded support invertebrates that are also a substantial source of food for rearing juveniles. Increased areas resulting from flooded habitat can also reduce the competition for food and space and potentially decrease the possible encounters with predators (Sommer et al. 2001). Juvenile chinook salmon that grow faster are likely to migrate downstream sooner, which helps to reduce the risks of predation and competition in freshwater systems.

Juvenile chinook salmon in the Sacramento River move out of upstream spawning areas into downstream habitats in response to many factors, including inherited behavior, habitat availability, flow, competition for space and food, and water temperature. The number of juveniles that move, and the timing of movement are highly variable. Storm events and the resulting high flows appear to trigger movement of substantial numbers of juvenile chinook salmon to downstream habitats. In general, juvenile abundance in the Delta increases as flow increases (U.S. Fish and Wildlife Service 1993).

Winter-run salmon smolts may migrate through the Delta and bay to the ocean from December through as late as May (Stevens 1989). The Sacramento River channel is the main migration route through the Delta. Adult winter-run chinook salmon spend 1–3 years in the ocean. About 67% of the adult escapement that leaves the ocean to spawn in the Sacramento River consists of 3-year-olds, 25% consists of 2-year-olds, and 8% consists of 4-year-olds (Hallock and Fisher 1985).

Adult winter-run chinook salmon leave the ocean and migrate through the Delta into the Sacramento River from November through July. Salmon migrate upstream past RBDD from mid-December through July, and most of the spawning population has passed RBDD by late June. Winter-run chinook salmon spawn from mid-April through August, and incubation continues through October. The primary spawning grounds in the Sacramento River are above RBDD. As mentioned above, adult winter-run chinook salmon do not enter the Feather River.

### **Central Valley Spring-Run Chinook Salmon**

Central Valley spring-run chinook salmon (*Oncorhynchus tshawytscha*) historically were the second most abundant run of Central Valley chinook salmon (Fisher 1994). They occupied the headwaters of all major river systems in the Central Valley where there were no natural barriers. Adults returning to spawn ascended the tributaries to the upper Sacramento River, including the Pit, McCloud, and Little Sacramento Rivers. They also occupied Cottonwood, Battle, Antelope, Mill, Deer, Stony, Big Chico, and Butte Creeks, and the Feather, Yuba, American, Mokelumne, Stanislaus, Tuolumne, Merced, San Joaquin, and Kings Rivers. Spring-run chinook salmon migrated farther into headwater streams where cool, well-oxygenated water is available year round.

Current surveys indicate that remnant, nonsustaining spring-run chinook salmon populations may be found in Cottonwood, Battle, Antelope, and Big Chico Creeks (California Department of Water Resources 1997). More sizable, consistent runs of naturally produced fish are found only in Mill and Deer Creeks. The Feather River Fish Hatchery sustains the spring-run population on the Feather River, but the genetic integrity of that run is questionable (California Department of Water Resources 1997). Estimates since 1953 on the Feather River indicate that numbers of spring-run chinook salmon returning to the hatchery average around 2,115, although the estimates have increased dramatically since 1990 (California Department of Fish and Game 2006). The occurrence of Central Valley spring-run chinook salmon in the Feather River near the FRLRP project site would be limited to adults moving upstream to the Feather River Fish Hatchery and juveniles emigrating downstream.

Juveniles display considerable variation in stream residence and migratory behavior. Juvenile spring-run chinook salmon may leave their natal streams as fry soon after emergence or rear for several months to a year before migrating as smolts or yearlings (Yoshiyama, Fisher, and Moyle 1998). Triggers for downstream movement are similar to those described above for winter-run chinook salmon.

Historical records indicate that adult spring-run chinook salmon enter the main stem Sacramento River in February and March and continue to their spawning streams, where they then hold in deep, cold pools until they spawn. Spring-run are sexually immature during their spawning migration. Some adult spring-run chinook salmon start arriving in the Feather River below the Fish Barrier Dam in June. They remain there until the fish ladder opens in early September.

Spawning and rearing requirements for spring-run chinook salmon are similar to those identified above in the discussion for winter-run chinook salmon. Spawning occurs in gravel beds in late August through October, and emergence takes place in March and April. Spring-run chinook salmon appear to emigrate at two different life stages: fry and yearlings. Fry move between February and June, while the yearling spring-run emigrate October to March, peaking in November (Cramer and Demko 1997).

On March 9, 1998 (63 FR 11481), NMFS issued a proposed rule to list spring-run chinook salmon as endangered. NMFS designated the Central Valley spring-run chinook as threatened on September 16, 1999 (64 FR 50393). On February 5, 1999, the California Fish and Game Commission listed spring-run chinook salmon as threatened under CESA. Critical habitat had originally been designated for Central Valley spring-run chinook salmon by NMFS (65 FR 7764, February 16, 2000). However, following a lawsuit (*National Association of Home Builders et al. v. Donald L. Evans, Secretary of Commerce, et al.*), NMFS rescinded the listing. After further review, critical habitat for the Central Valley spring-run chinook salmon ESU was designated on August 12, 2005. Critical habitat is designated to include select waters in the Sacramento and San Joaquin River basins, including the Feather River.

### **Central Valley Fall/Late Fall-Run Chinook Salmon**

The Central Valley fall/late fall-run chinook salmon ESU (*Oncorhynchus tshawytscha*) is identified by the NMFS as species of special concern. Spawning escapement surveys on the Feather River are conducted annually by DFG between the Oroville Fish Barrier Dam and the Thermalito Afterbay outlet and between the afterbay outlet and the Gridley boat ramp above Honcut Creek. Annual estimates (since 1953) of the population of fall-/late fall-run chinook salmon based on these survey counts and hatchery returns have averaged approximately 49,000 fish (California Department of Fish and Game 2006). The occurrence of Central Valley fall/late fall-run chinook salmon in the Feather River near the FRLRP project site would be limited to adults moving upstream to the Feather River Fish Hatchery and juveniles emigrating downstream.

Spawning and rearing requirements for fall-/late fall-run chinook salmon are similar to those identified above in the discussion for winter-run chinook salmon. Juvenile fall-/late fall-run chinook salmon typically rear in fresh water (in their natal streams, the Sacramento River, and the Delta) for up to 5 months before entering the ocean. Juveniles migrate downstream during January through June. Juvenile chinook salmon prefer water depths of 0.5–3.3 feet and velocities of 0.26–1.64 feet per second (Raleigh et al. 1986). Important winter habitat for juvenile chinook salmon includes flooded bars, side channels, and overbank areas with relatively low water velocities. Juvenile chinook salmon have been found to successfully rear in floodplain habitat, which routinely floods but is dry at other times. Growth rates appear to be enhanced by the conditions found in floodplain habitat.

Fall-/late fall-run chinook salmon emigrate as fry and subyearlings and remain off the California coast during their ocean migration (63 FR 11481, March 9, 1998).

Adult fall-/late fall-run chinook salmon enter the Sacramento and San Joaquin River systems from July through April and spawn from October through February. During spawning, the female digs a redd (gravel nest) in which she deposits her eggs, which are then fertilized by the male. Optimal water temperatures for egg incubation are 6.7°–12.2°C (Rich 1997). Newly emerged fry remain in shallow, lower-velocity edgewater, particularly where debris congregates and makes the fish less visible to predators (California Department of Fish and Game 1998). The duration of egg incubation and time of fry emergence depends largely on water temperature. In general, eggs



hatch after a 3- to 5-month incubation period, and alevins (yolk-sac fry) remain in the gravel until their yolk-sacs are absorbed (2–3 weeks).

## **Sacramento Splittail**

Recent data indicate that Sacramento splittail (*Pogonichthys macrolepidotus*) occur in the Sacramento River as far upstream as the RBDD (Sommer, Baxter, and Herbold 1997), and that some adults spend the summer in the mainstem Sacramento River rather than returning to the Bay-Delta estuary (Baxter 1999). The distribution and extent of spawning and rearing along the mainstem Sacramento River is unknown. Although Sacramento splittail are known to occur in the lower Feather River, occurrences are intermittent and infrequent. Any presence of Sacramento splittail in the Feather River near the FRLRP project site would be limited to adults and potentially juveniles spending short periods in the area then returning downstream to areas more typically considered part of their range.

Sacramento splittail spawn between early March and May over flooded terrestrial or aquatic vegetation in lower reaches of the Sacramento River (Wang 1986, Moyle et al. 1995, Moyle 2002). Spawning has been observed to occur as early as January and to continue through July (Wang 1986). Larval splittail are commonly found in the shallow, vegetated areas where spawning occurs. Larvae eventually move into deeper, open-water habitats as they grow and become juveniles. During late winter and spring, young-of-year juvenile splittail (i.e., those less than 1-year old) are found in floodplain habitat, sloughs, rivers, and Delta channels near spawning habitat. Juvenile splittail gradually move from shallow, nearshore habitats to the deeper, open-water habitats of Suisun and San Pablo Bays (Wang 1986). In areas upstream of the Delta, juvenile splittail can be expected to be present in the flood basins (i.e., Sutter and Yolo Bypasses and the Sacramento River) when these areas are flooded during the winter and spring.

In 1999, 4 years after candidate status, the splittail was listed as threatened under ESA (64 FR 25, March 10, 1999). Fall mid-water trawl surveys indicate that abundance of juvenile splittail has been highly variable from year to year, with peaks and declines coinciding with wet and dry periods, respectively, and correlated with the availability of flooded shallow-water habitat. After the listing, the State Water Contractors, the San Luis and Delta-Mendota Water Authority, and others challenged the listing, contending that it violated ESA and the Administrative Procedures Act. On June 23, 2000, the U.S. District Court in Fresno ruled in favor of the plaintiffs and found the listing unlawful. On September 22, 2003, USFWS delisted splittail as a threatened species, indicating that habitat restoration actions such as those associated with the CALFED Bay-Delta Program (CALFED program) and the Central Valley Project Improvement Act are likely to keep the splittail from becoming endangered in the foreseeable future (68 FR 55139, September 22, 2003).

## **3.9.2 ENVIRONMENTAL CONSEQUENCES**

### **3.9.2.1 SIGNIFICANCE THRESHOLDS**

A project alternative would have a significant impact on special-status biological resources, including plant species, terrestrial wildlife species, and aquatic species, if it would:

- ▶ have a substantial adverse effect, either directly or through habitat modifications, on any special-status plant or terrestrial biological species;
- ▶ reduce the number or restrict the range of an endangered, rare, or threatened species;
- ▶ substantially reduce or degrade the habitat of a special-status aquatic species, potentially resulting in a reduction in special-status species abundance;

- ▶ directly or indirectly reduce the growth, survival, or reproductive success of substantial numbers of special-status aquatic species; or
- ▶ directly or indirectly reduce the growth, survival, or reproductive success of individuals of an aquatic species listed or proposed for listing as threatened or endangered under the ESA.

As stated above, in July 2007, rare plant surveys were conducted targeting potential occurrences of rose mallow and Wright's trichocoronis that could be disturbed as a result of project implementation. In summary, no populations of these special-status plant species were identified during the survey. Therefore, although suitable habitat for these species occurs at the project site, they are not expected to occur and are not addressed further.

This section evaluates the direct effects of the Applicant Preferred Alternative – ASB Setback Levee Alternative and other alternatives on special-status species, including terrestrial and aquatic species. Potential indirect effects of the Applicant Preferred Alternative and other alternatives are addressed in Chapter 4.0, "Cumulative and Growth-Inducing Effects." For example, for an evaluation of the effects to Swainson's hawk nesting and foraging habitat from development potentially facilitated by the Applicant Preferred Alternative and other action alternatives, see Section 4.1.2.6, "Biological Resources." For an evaluation of the combined effects on sensitive habitats available to species, including special-status species, from implementation of past, present, and future projects in the region, see Section 4.2.3.4, "Ecosystem and Habitat Restoration Efforts," and Section 4.2.4.5, "Terrestrial Biological Resources."

### **3.9.2.2 APPLICANT PREFERRED ALTERNATIVE – ASB SETBACK LEVEE ALTERNATIVE**

#### **AP Impact 3.9-a: Adverse Effects on Special-Status Wildlife Species**

Effects on special-status species from the Applicant Preferred Alternative – ASB Setback Levee Alternative and other alternatives are summarized in Table 3.9-4. Impacts in Table 3.9-4 are expressed in terms of acres of potential habitat disturbed/removed under each alternative; except in the case of valley elderberry longhorn beetle, where impacts are expressed in terms of elderberry shrubs affected. Acreages of impact are not provided for western yellow-billed cuckoo and Pacific western big-eared bats either because habitat for the species would not be affected by the project (i.e., western yellow-billed cuckoo), or micro-habitat requirements for the species do not allow acres of potential habitat to be reasonably quantified (i.e., Pacific western-big eared bat).

Valley elderberry longhorn beetles have been documented as recently as 2002 at the Bobelaine Audubon Sanctuary, on the west (Sutter County) side of the Feather River (California Natural Diversity Database 2007). Blue elderberry shrubs, the host plant for valley elderberry longhorn beetle larvae, are found throughout riparian habitat along much of the Feather River floodway. Shrubs grow along the edge of the riparian corridor, immediately adjacent to the existing levees and along various drainage and waterways east of the existing levee. Detailed mapping of elderberry shrubs has been conducted (Figures 3.9-1a and 3.9-1b), as well as counts of individual stems 1 inch or greater in diameter. A total of 58 elderberry shrubs may require removal during implementation of the Applicant Preferred Alternative – ASB Setback Levee Alternative. Of the 58 elderberry shrubs that may require removal, 24 showed evidence of valley elderberry longhorn beetle exit holes in one or more stems. This information has been provided to the USFWS as part of the ESA Section 7 consultation, which was completed with issuance of the final Biological Opinion (BO) on August 28, 2008. Details on locations of elderberry shrubs that would be affected by construction are documented in the "Biological Assessment and Additional Information, Segment 2," that is contained in Appendix H, "Correspondence Regarding Special-Status Species." The final BO is also attached to this EIS in Appendix H. Removal of these shrubs without appropriate compensation would be a significant adverse effect. Based on consultation with USFWS, TRLIA has committed to establishing a permanent conservation easement within the setback area to compensate for elderberry shrubs that are expected to be moved out of the project construction area. Approximately 40 acres would be retained to accommodate transplanted shrubs, seedlings, and associated riparian species, in accordance with the USFWS *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (USFWS 1999). The conservation easement

would be established in perpetuity. Through transplanting of existing shrubs and additional elderberry plantings in the mitigation area there would ultimately be a net gain in habitat for valley elderberry longhorn beetle after project implementation. Elderberry shrubs are tolerant of, and often favor, periodic inundation, as evidenced by the fact that the highest densities of elderberry shrubs in the project vicinity occur on the water side of the existing Feather River levee. Therefore, periodic flooding of the setback area after removal of the existing levee would not have an adverse affect on elderberry shrubs currently located in the setback area or the valley elderberry longhorn beetle.

**Table 3.9-4  
Impacts to Special-Status Wildlife Species Resulting from Project Alternatives**

| Species                                                        | Alternative                                                                               |                                                                                           |                                                                                                        |                                                                                                                                                                               |
|----------------------------------------------------------------|-------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                | Applicant Preferred Alternative – ASB Setback Levee Alternative                           | Intermediate Setback Levee Alternative                                                    | Levee Strengthening Alternative                                                                        | No- Action Alternative                                                                                                                                                        |
| Valley elderberry longhorn beetle (elderberry shrubs affected) | 58 elderberry shrubs to be removed and transplanted                                       | 53 elderberry shrubs to be removed and transplanted                                       | No elderberry shrubs requiring removal/transplanting                                                   | No elderberry shrubs requiring removal/transplanting                                                                                                                          |
| Giant garter snake                                             | 16.1 acres of aquatic habitat and 10.6 acres of upland habitat removed or made unsuitable | 16.1 acres of aquatic habitat and 10.6 acres of upland habitat removed or made unsuitable | Less than 1 acre of suitable aquatic habitat affected                                                  | No suitable aquatic or upland habitat to be directly affected; however, mortality to giant garter snakes could occur as a result of flooding from a levee breach              |
| Northwestern pond turtle                                       | Approximately 2 acres of suitable aquatic habitat removed/disturbed                       | Approximately 2 acres of suitable aquatic habitat removed/disturbed                       | Less than 1 acre of suitable aquatic habitat affected                                                  | No suitable aquatic habitat to be affected                                                                                                                                    |
| Loggerhead shrike                                              | 8.5 acres of potential nesting habitat removed/disturbed                                  | 8.5 acres of potential nesting habitat removed/disturbed                                  | No potential nesting habitat affected                                                                  | No potential nesting habitat affected                                                                                                                                         |
| Tricolored blackbird                                           | 8.5 acres of potential nesting habitat removed/disturbed                                  | 8.5 acres of potential nesting habitat removed/disturbed                                  | No potential nesting habitat affected                                                                  | No potential nesting habitat affected                                                                                                                                         |
| Special-status fish species                                    | 3–4 acres of riparian vegetation providing fish habitat values temporarily removed        | 3–4 acres of riparian vegetation providing fish habitat values temporarily removed        | Temporary removal of individual riparian trees providing less than 1 total acre of fish habitat values | No special-status fish habitat directly affected; however, mortality to fish could occur as a result of fish entrapment and degradation of water quality after a levee breach |

The northwestern pond turtle has been documented along the Feather River in Bobelaine Audubon Sanctuary, and suitable aquatic habitat for the species is provided in irrigation/drainage canals with the project area, including the Plumas Lake Canal. Construction of the setback levee and activities associated with the relocation of Pump Station No. 3 could result in disturbance and/or removal of approximately 2 acres of suitable aquatic habitat for northwestern pond turtle, and direct mortality of turtles, if any are present in the affected areas. This would be a

significant adverse effect. Given that northwestern pond turtles are known to occur in the Feather River channel, removal of the existing levee and subsequent periodic inundation of the setback area would not have an adverse effect on pond turtles that may occur in drainage canals retained in the setback area.

Irrigation/drainage canals and ditches and adjacent uplands east of the existing Feather River levee provide potentially suitable habitat for giant garter snake (Figure 3.9-2). Construction of the proposed setback levee would result in fill of small portions of aquatic habitat within the setback levee footprint. Borrow excavation in the setback area could result in impacts on upland habitat for giant garter snake in areas adjacent to suitable aquatic habitat. Construction activities could also result in direct take of giant garter snake, particularly during the snake's inactive season (October through April). After removal of the existing levee, the levee setback area would become part of the Feather River floodway and would be inundated for multiple continuous days during each flood event. If giant garter snakes are present within the setback area, inundation would displace wintering individuals from their burrows and could result in mortality. The removal of giant garter snake habitat during project construction and the loss of habitat due to exposure of lands within the setback area to periodic flooding are considered significant adverse effects. Based on consultation with USFWS and in accordance with the BO (Appendix H), TRLIA plans to purchase mitigation credits at a ratio of 3:1 upland habitat to aquatic habitat. Based on the estimated acreage of impacted habitat (16.1 acres of aquatic habitat and 10.6 acres of upland habitat), TRLIA plans to acquire 49 acres of aquatic habitat and 32 acres of upland habitat at the Wildlands, Inc., Gilsizer Slough South Giant Garter Snake Conservation Bank, which is an approved mitigation bank in Sutter County.

No potential habitat for loggerhead shrike and tricolored blackbird that occurs in the existing Feather River channel (water side of the existing levee) would be affected by the Applicant Preferred Alternative. Riparian habitats within the levee setback area could be suitable for loggerhead shrike and tricolored blackbird. Although approximately 8.5 total acres of potential loggerhead shrike and tricolored blackbird nesting habitat could be directly affected by implementation of the Applicant Preferred Alternative – ASB Setback Levee Alternative, effects would be spread across small pockets of habitat that are of relatively low quality in comparison to less disturbed and more contiguous habitat closer to the main channel of the Feather River. Potential foraging habitat occurs throughout the project study area and large quantities of foraging habitat would remain available both during and after project construction. Ample habitat is available for these species in the existing Feather River floodway and potential impacts to these species associated with the Applicant Preferred Alternative would be minimal. Any adverse effects that might occur for loggerhead shrike and tricolored blackbird are not considered significant.

Pacific western big-eared bats could forage in the project area, including in the vicinity of the existing Feather River levee and the proposed setback levee. Potential foraging habitat occurs throughout the project study area and large quantities of foraging habitat would remain available both during and after project construction. Trees in and near the project area could provide roost sites for a small number of bats, but the project area does not provide roosting habitat capable of supporting large numbers of individuals or maternity roosts. Because no important bat roost sites or maternity sites are anticipated to exist in the project area, potential effects on Pacific western big-eared bats from implementation would be minimal. Any adverse effects that might occur for Pacific western big-eared bats are not considered significant.

### **AP Impact 3.9-b: Potential Adverse Water Quality Effects on Special-Status Fish Species**

#### ***Sediments, Turbidity, and Contaminants***

Construction of the proposed setback levee, development of borrow areas, removal of the existing Feather River levee, and other ground disturbing project activities associated with the Applicant Preferred Alternative – ASB Setback Levee Alternative would result several hundred acres of soil disturbance. These disturbed areas could be susceptible to erosion and transport of soil and sediment into local waterways and the Feather River. Soil erosion could temporarily increase turbidity and sedimentation downstream of the construction sites if soils are

transported in river flows or stormwater runoff (See Section 3.4, “Water Quality” for additional discussion of this issue).

Fish population levels and survival have been linked to levels of turbidity and siltation in a watershed. Prolonged exposure to high levels of suspended sediment could create a loss of visual capability in fish, leading to a reduction in feeding and growth rates; a thickening of the gill epithelia, potentially causing the loss of respiratory function; clogging and abrasion of gill filaments; and increases in stress levels, reducing the tolerance of fish to disease and toxicants (Waters 1995).

Also, high levels of suspended sediments would cause the movement and redistribution of fish populations, and could affect physical habitat. Once suspended sediment is deposited, it could reduce water depths in pools, decreasing the water’s physical carrying capacity for juvenile and adult fish (Waters 1995). Increased sediment loading could degrade food-producing habitat downstream of the project area. Sediment loading could interfere with photosynthesis of aquatic flora and displace aquatic fauna. Many fish are sight feeders, and turbid waters reduce the ability of these fish to locate and feed on prey. Some fish, particularly juveniles, could become disoriented and leave areas where their main food sources are located, ultimately reducing their growth rates.

Avoidance is the most common result of increases in turbidity and sedimentation. Fish will not occupy areas unsuitable for survival unless they have no other option. Some fish, such as bluegill and bass species, will not spawn in excessively turbid water (Bell 1991). Therefore, the Applicant Preferred Alternative could cause fish habitat to become limited if high turbidity resulting from construction-related erosion were to preclude a species from occupying habitat required for specific life stages.

In addition, the potential exists for contaminants such as fuels, oils, and other petroleum products used in construction activities to be introduced into the water system directly or through surface runoff. Contaminants may be toxic to fish or may alter oxygen diffusion rates and cause acute and chronic toxicity to aquatic organisms, thereby reducing growth and survival. Any of the impact mechanisms listed above could directly or indirectly reduce the growth, survival, or reproduction success of individuals of a species listed or proposed for listing as threatened or endangered under the ESA, resulting in a significant adverse effect.

Any of the impact mechanisms listed above could directly or indirectly reduce the growth, survival, or reproductive success of individuals of a species listed or proposed for listing as threatened or endangered. However, the impact cannot be specifically quantified because the volume, timing, and location of any sediment or contaminant releases that might occur cannot be determined and the fish species and life stage (adult vs. juvenile) that might be present during a potential sediment or contaminant release cannot be determined since special-status fish species only occur infrequently and intermittently in the project area (see description of special-status species above). It would be purely conjecture to say that a particular number of individual fish or acreage of fish habitat would be adversely affected. Nevertheless, because the potential exists for project construction to directly reduce the growth, survival, or reproductive success of individuals of a species listed or proposed for listing as threatened or endangered under the ESA, a significant adverse effect could occur.

### ***Potential Borrow Material Contaminants***

Borrow material for construction of the proposed setback levee would be obtained from soil borrow areas between the setback levee alignment and the Feather River and east of the setback levee alignment. Material from the existing levee would be used to fill borrow areas in the setback area, and would be exposed to inundation during flood events. Because of the age of the existing levee and the unknown condition of the proposed borrow areas, there is potential for soil material used in the setback levee and to fill borrow areas to contain elevated levels of hazardous substances. Other disturbed soils in the proposed levee setback area could contain such substances as well (see Section 3.5, “Hazardous Materials,” for additional discussion of this issue). If present, hazardous substances could be released into flowing water when it enters the levee setback area and could harm

sensitive fish and habitat resources and result in a significant adverse effect. Again, for the reasons described above, attempting to quantify the effects of this impact on special-status fish species would be purely conjecture.

### **AP Impact 3.9-c: Substantially Reduce the Quality and Quantity of Important Habitat for Special-Status Fish Species**

#### ***Loss of Overhead Cover and Instream Woody Material***

Under the Applicant Preferred Alternative – ASB Setback Levee Alternative, no losses of riparian vegetation that contributes to fish habitat would result from construction of the proposed setback levee. Degradation/removal of the existing levee would be conducted from within the levee right-of-way and the land side of the right-of-way. No riparian vegetation or instream woody material would be removed during degradation of the existing levee. However, 3–4 acres of riparian vegetation that potentially provides overhead cover for fish or contributes instream woody material to the Feather River channel would be cleared on the water side of the existing levee during construction of the floodplain drainage swale to allow drainage of the levee setback area to the Feather River channel after flood events (Table 3.9-4) (see also Figure 2-1 in Chapter 2, “Alternatives”). A majority of this riparian vegetation does not provide fish habitat all year, but only during high water events when waters in the Feather River leave the banks and inundate the floodway. Any removal of riparian vegetation or woody material in the floodplain during construction of the drainage swale would be minor and entirely offset by increased riparian habitat within the alignment of the existing levee over time. The site of the proposed drainage swale is the existing outfall channel for discharges from the current Pump Station No. 3. Rather than constructing a completely new drainage channel through riparian vegetation, expanding the existing outfall channel to function as the floodplain drainage swale minimizes earth moving, ground disturbance, and impacts to riparian vegetation. Effects on fish habitat would be negligible and no significant adverse effects would occur.

#### ***Increased Fish Habitat***

The levee system along much of the lower Feather River limits aquatic and riparian habitats to relatively narrow corridors. Setting back the levee along the proposed setback levee alignment would widen the lower Feather River floodway by as much as approximately 0.5 mile. This action would expand the available floodplain habitat for fish by approximately 1,300 acres.

Floodplains provide important seasonal habitat for native fish species during the winter and spring flood periods. For this reason, a key restoration goal of the CALFED program is to improve the connectivity between rivers and floodplain habitat, as well as increase the amount of shallow water habitat in the Central Valley (CALFED Bay-Delta Program 2001). Numerous studies have shown that shallow water and dense vegetation in these areas provide highly productive rearing areas for numerous species, including chinook salmon and Sacramento splittail (Sommer, Baxter, and Herbold 1997; Baxter, Harrell, and Grimaldo 1996; Moyle et al. 2000). The newly created floodplain could create refugia for fish during peak flows even if the habitat is only temporary. Many of these benefits would occur even if the levee setback area continued in agricultural operations. If habitat restoration were undertaken in all or part of the levee setback area, this could help reverse regional riparian habitat losses; increase the effective amount and quality of habitat available to fish; and improve the conveyance capacity of the floodplain to provide migration corridors for, and sustain, fish populations. Providing wider floodplains and larger habitat units is especially important for migratory fish species, such as salmon and steelhead. Because the Applicant Preferred Alternative – ASB Setback Levee Alternative could substantially increase the extent of floodplain habitat potentially available to native fishes for rearing, this impact would be potentially beneficial.

### **AP Impact 3.9-d: Substantially Reduce Special-Status Fish Populations**

The Applicant Preferred Alternative – ASB Setback Levee Alternative would be expected to have long-term fisheries benefits, because it would increase by approximately 1,300 acres the extent of floodplain habitat potentially available to native fishes for rearing. However, following periods when high flows pass through the levee setback area, receding floodwater could collect in existing ponds, channels and ditches, borrow areas, and



other depressions. Fish that enter the floodway during higher flows, particularly juvenile chinook salmon and steelhead, could become stranded in these areas. Fish that are trapped in such depressions for long periods of time would experience high mortality rates as a result of lethal water temperatures, poor water quality, predation, or desiccation of these areas. Stranding could adversely affect populations of special-status fish species and result in a significant adverse effect. The numbers of fish that might be affected by stranding cannot be specifically quantified because the fish species and life stage (adult vs. juvenile) that might be present when floodwaters recede after a high water event cannot be determined. Special-status fish species only occur infrequently and intermittently in the project area (see description of special-status species above) and different species, life stages, and densities may be present as high water events occur during different months during the flood season. It would be purely conjecture to say that a particular number of individual fish would be adversely affected. Nevertheless, because the potential exists for project operation to directly result in mortality to individuals of a species listed or proposed for listing as threatened or endangered under the ESA, a significant adverse effect could occur.

### **3.9.2.3 INTERMEDIATE SETBACK LEVEE ALTERNATIVE**

#### **ISL Impact 3.9-a: Adverse Effects on Special-Status Wildlife Species**

Except for the setback levee alignment shift in the northern portion of the Intermediate Setback Levee Alternative's alignment, the construction of the Intermediate Setback Levee Alternative would be very similar to the Applicant Preferred Alternative – ASB Setback Levee Alternative, including use of borrow areas, relocation of Pump Station No. 3, enlargement of the drainage channel near the existing Pump Station No. 3, and removal of the existing levee. Therefore, disturbance of habitat and potential take of special-status species resulting from the Intermediate Setback Levee Alternative would be comparable to the Applicant Preferred Alternative. Significant adverse effects would occur related to valley elderberry longhorn beetle (53 shrubs removed and relocated), northwestern pond turtle (2 acres of potential habitat removed/disturbed), and giant garter snake (16.1 acres of aquatic habitat and 10.6 acres of upland habitat removed or made unsuitable). TRLIA would commit to establishing a permanent conservation easement within the setback area to compensate for elderberry shrubs that would be moved out of the project construction area. Both the Applicant Preferred Alternative and the Intermediate Setback Levee Alternative result in inundation of similar amounts of potential giant garter snake habitat in the respective setback areas, and TRLIA would purchase mitigation credits at a ratio of 3:1 upland habitat to aquatic habitat to compensate for potential impacts to giant garter snake.

#### **ISL Impact 3.9-b/c/d: b) Potential Adverse Water Quality Effects on Special-Status Fish Species; c) Substantially Reduce the Quality and Quantity of Important Habitat for Special-Status Fish Species; d) Substantially Reduce Special-Status Fish Populations**

All impacts to fishery resources described above for the Applicant Preferred Alternative – ASB Setback Levee Alternative would also apply to the Intermediate Setback Levee Alternative. Impacts related to sediments, turbidity, and contaminants; loss of overhead cover and instream woody material; and potential borrow contaminants would be the same for the two alternatives (Table 3.9-4). Adverse effects associated with fish stranding and potential beneficial effects associated with increased fish habitat would be less under the Intermediate Setback Levee Alternative due to the smaller size of the setback area (i.e., approximately 1,100 acres).

### **3.9.2.4 LEVEE STRENGTHENING ALTERNATIVE**

For impacts to special-status fish species, the Levee Strengthening Alternative would not include a setback levee and associated floodway expansion, but rather results in a continuation of the existing levee configuration in the project area. Therefore, impacts described for the Applicant Preferred Alternative – ASB Setback Levee Alternative related to potential borrow material contaminants, fish stranding, and increased fish habitat would not occur under this alternative.

### **LS Impact 3.9-a: Adverse Effects on Special-Status Wildlife Species**

The Levee Strengthening Alternative would not require removal of elderberry shrubs located within the setback alignment or within the channel between the existing levee and the Feather River. Furthermore, because the Levee Strengthening Alternative would not alter the location of the existing levee to create an expanded floodway on land that is currently behind the existing levee, this alternative would not allow seasonal inundation of any sensitive habitats not currently experiencing winter flooding. Therefore, the Levee Strengthening Alternative would not result in potential alteration to giant garter snake habitat or take of individual snakes as a result of seasonal flooding. Temporary disturbance to the Plumas Lake Canal related to the decommissioning of the existing Pump Station No. 3 and loss of aquatic habitat associated with construction of a new Pump Station No. 3, would affect less than 1 acre of potential habitat for northwestern pond turtle and giant garter snake. Although the area of affected potential habitat is small, this would still be considered a significant adverse effect. Like the setback levee alternatives described above, the Levee Strengthening Alternative would not result in significant adverse effects related to loggerhead shrike, tricolored blackbird, or Pacific western big-eared bat.

### **LS Impact 3.9-b: Potential Adverse Water Quality Effects on Special-Status Fish Species**

Repairing the existing left bank Feather River levee in Segment 2 would disturb soils along the top and water side of the existing levees. Any resulting erosion could temporarily increase turbidity and sedimentation downstream of the construction sites if soils are transported in river flows or stormwater runoff. Potential effects on special-status fish species from this turbidity and sedimentation would be the same as described above for the Applicant Preferred Alternative – ASB Setback Levee Alternative. For the reasons described above for the Applicant Preferred Alternative, attempting to quantify the effects of this impact on special-status fish species would be purely conjecture.

### **LS Impact 3.9-c: Substantially Reduce the Quality and Quantity of Important Habitat for Special-Status Fish Species**

No riparian habitat is located on the surface of the existing Feather River levee in the project area and no losses of riparian habitat are anticipated during the strengthening of the levee. However, small amounts of riparian vegetation (i.e., sporadic individual trees) that potentially provide overhead cover for fish or contribute instream woody material to the Feather River channel, may need to be removed or cleared from the waterside toe of the existing levee during the correction of identified erosion problem areas in project Segment 2. These trees only contribute to fishery habitat during high water events when the area near the toe of the existing levee is inundated. Removal of riparian vegetation adjacent to the existing levee or otherwise in the floodplain would be minor (i.e., sporadic individual trees) and temporary, and revegetation would occur over time (Table 3.9-4). Effects on fish habitat would be negligible and no significant adverse effect would occur.

#### **3.9.2.5 NO-ACTION ALTERNATIVE**

If no permissions were granted to alter the existing levee or discharge dredged or fill material into waters of the United States, existing habitat conditions would not be modified, and no construction activities that could directly or indirectly affect special-status plant, wildlife, or fish species would occur, other than those that might be associated with the continuation of existing levee inspection and maintenance requirements. Under these conditions, heavy underseepage and loss of foundation soils would be expected to continue and the threat of another levee failure would remain. Under the No-Action Alternative, it is possible that localized levee repairs (e.g., correction of identified waterside erosion sites) could be authorized under the federal Clean Water Act (CWA) Nationwide Permit (NWP) #3. This work would be unlikely to result in significant impacts to protected species.

If no action was taken to completely repair this deficient levee segment, a levee failure could inundate areas that presently may provide upland habitat where giant garter snakes hibernate through the flood season. If giant garter

snakes were present in these areas, flooding would likely result in direct mortality to this species. Emergency levee repair work, clean-up and reconstruction after a flood event, and other activities in response to a levee breach could also result in the disturbance of special-status wildlife species and their habitats. In addition, a levee failure, which has a much higher probability of occurring under the No-Action Alternative, would likely lead to the displacement of fish, including special-status species, into flooded areas and subsequent stranding and mortality. As described previously in Section 3.4.2 in the discussion of the No-Action Alternative, adverse water quality effects could result from releases of hazardous materials during a flood event, which could lead to direct mortality of various fish species. Emergency cleanup activities following a levee breach could cause the release of hazardous materials and contaminants (e.g., raw cement/concrete or washings thereof, asphalt, paint or other coating material, oil or other petroleum products) into area waterways; high levels of suspended sediments would affect important fish habitat and could increase the potential for mortality of special-status species.

### 3.9.3 MITIGATION

No mitigation measure is required for the following impact:

#### **Impact AP/ISL/LS 3.9-c: Substantially Reduce the Quality and Quantity of Important Habitat for Special-Status Fish Species**

The following mitigation measure related to special-status wildlife species would be applied to the **Applicant Preferred Alternative – ASB Setback Levee Alternative** and the **Intermediate Setback Levee Alternative**.

#### **Mitigation Measure 3.9-a1: Minimize Adverse Effects on Valley Elderberry Longhorn Beetle**

TRLIA and its primary contractors for engineering design and construction shall ensure that the following measures are implemented to minimize and compensate for potential project effects on valley elderberry longhorn beetles. TRLIA has already committed to implementing these measures through the California Environmental Quality Act (CEQA) EIR process. These measures also repeat and/or support mitigation requirements identified in the USFWS BA and final BO. Additional mitigation measures provided by USFWS as part of the final BO shall also be implemented. As discussed above, approximately 40 acres would be held under a conservation easement within the levee setback area to accommodate transplanted elderberry shrubs, seedlings, and associated riparian species, in accordance with USFWS guidelines. The conservation easement would be established in perpetuity.

1. A worker awareness training program for construction personnel will be conducted by a qualified biologist prior to beginning construction activities. The program will inform all construction personnel about the life history and status of the beetle, requirements to avoid damaging the elderberry plants, and the possible penalties for not complying with these requirements. Written documentation of the training will be submitted to USFWS within 30 days of its completion.
2. Pre-construction and post-construction surveys will be done of the elderberry shrubs in the project area. The post-construction survey will confirm that there was no additional damage to any of the elderberry shrubs than as described in this EIS and the BO.
3. All areas to be avoided during construction activities will be fenced and flagged. In most cases, fencing will be placed at least 20 feet from the dripline of the shrub. In some cases, construction activity may be required within 20 feet of a shrub. In these cases, fencing will be placed at the greatest possible distance from the shrubs.
4. Transplant up to 58 elderberry shrubs and provide additional plantings as described in the USFWS 1999 *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (Conservation Guidelines). Elderberry shrubs that require removal will be transplanted to an appropriate location within the project area agreed upon

by USFWS. Eight elderberry shrubs transplanted in August or September 2008 will compensate an additional 2.5 times the Conservation Guidelines ratios because the shrubs would be transplanted outside of the elderberry shrub dormant season.

5. No insecticides, herbicides, fertilizers, or other chemicals that might harm the beetle or its host plant will be used within 100 feet of elderberry shrubs. All drainage water during and following construction will be diverted away from the elderberry shrubs.
6. Dirt roadways and other areas of disturbed bare ground within 100 feet of elderberry shrubs will be watered at least twice a day to minimize dust emissions.
7. A qualified biologist (monitor) will be on-site for the duration of the transplanting of the elderberry shrubs to ensure that no unauthorized take of the beetle occurs. If unauthorized take occurs, the monitor will have the authority to stop work until corrective measures have been completed. The monitor must immediately report any unauthorized take of the beetle or its habitat to USFWS and to DFG.

With implementation of these measures the project would result in a net gain in habitat for the valley elderberry longhorn beetle and would not result in significant adverse effects on valley elderberry longhorn beetle.

The following mitigation measures related to special-status wildlife species would be applied to the **Applicant Preferred Alternative – ASB Setback Levee Alternative, the Intermediate Setback Levee Alternative, and the Levee Strengthening Alternative**.

#### **Mitigation Measure 3.9-a2: Minimize Adverse Effects on Northwestern Pond Turtle**

TRLIA and its primary contractors for engineering design and construction shall ensure that the following measures are implemented to minimize potential project effects on northwestern pond turtles:

- a. Conduct surveys during and after dewatering. A qualified biologist shall observe dewatering of aquatic habitat within the setback area to determine if northwestern pond turtles are present as water is removed. A qualified biologist shall also conduct surveys for northwestern pond turtles immediately after any dewatering is complete and before any fill of aquatic habitat. If no pond turtles are found, no further mitigation will be required.
- b. Capture and move turtles. If any pond turtles are found, the biologist shall capture them and move them to suitable habitat in the vicinity of the project site.

With implementation of these measures the project would not result in significant adverse effects on northwestern pond turtles.

#### **Mitigation Measure 3.9-a3: Minimize Adverse Effects on Giant Garter Snake**

TRLIA and its primary contractors for engineering design and construction shall ensure that the following measures are implemented to minimize and compensate for potential project effects on giant garter snakes. TRLIA has already committed to implementing these measures through the CEQA EIR process. These measures also repeat and/or support mitigation requirements identified in the USFWS BA and the final BO. Additional mitigation measures provided by USFWS as part of the final BO shall also be implemented. Based on requirements in the final BO, TRLIA plans to purchase giant garter snake mitigation credits in an approved mitigation bank at a ratio of 3 acres of credit for each acre of impact (3:1 mitigation ratio). For example, it is estimated that the Applicant Preferred Alternative – ASB Setback Levee Alternative would affect 16.1 acres of aquatic habitat and 10.6 acres of upland habitat. To satisfy mitigation requirements of USFWS, TRLIA plans to acquire 49 acres of aquatic habitat and 32 acres of upland habitat at the Wildlands, Inc., Gilsizer Slough South

Giant Garter Snake Conservation Bank, which is an approved mitigation bank in Sutter County. This mitigation strategy is consistent with the requirements outlined in the final BO and is in accordance with the *Guidelines for Restoration and/or Replacement of Giant Garter Snake Habitat* and the *Standard Avoidance and Minimization Measures During Construction Activities in Giant Garter Snake (Thamnophis gigas) Habitat* (included with the final Biological Opinion in Appendix H). Other mitigation measures for giant garter snake impacts are as follows:

1. A worker awareness training program for construction personnel will be conducted by a qualified biologist prior to beginning construction activities. The program will provide workers with information on their responsibilities with regard to the snake, an overview of the life-history of this species, a description of measures to minimize potential for take of the snake, and an explanation of the possible penalties for not properly implementing these measures. Written documentation of the training will be submitted to USFWS within 30 days of its completion.
2. All construction activity within snake habitat (e.g., aquatic and upland) would be conducted between May 1 and October 1. This is the active period for the snake and direct mortality is lessened because snakes are expected to actively move and avoid danger. More danger is posed to snakes during their inactive period because they are occupying underground burrows or crevices and are more susceptible to direct effects, especially during excavation activities. If it appears that construction activity may need to extend beyond October 1, the project proponent(s) would contact USFWS as soon as possible and no later than August 15 to determine if additional measures are necessary to minimize take of the snake. Dewatering of suitable aquatic habitat will not occur before April 15, and dewatered habitat will remain dry for at least 15 days prior to fill or excavation.
3. At least 30 days prior to initiating construction activities, the project proponents will submit the names and curriculum vitae of the biological monitor(s) for the project to USFWS for review and approval.
4. Within 24 hours before beginning construction activities, areas within 200 feet of suitable aquatic habitat for giant garter snake will be surveyed by a qualified biologist. The biologist will provide USFWS written documentation of the monitoring efforts within 48 hours after the survey is completed. Habitat will be re-inspected by the monitoring biologist whenever a lapse in construction activity of 2 weeks or greater occurs. The biologist will be present on-site during initial ground disturbance activities, including clearing and grubbing/stripping. The biologist will be available throughout the construction period and will conduct regular monitoring visits to ensure avoidance and minimization measures are being properly implemented.
5. The number of access routes, number and size of staging areas, and the total area of the proposed project activity will be limited to the minimum necessary. Routes and boundaries will be clearly demarcated. Movement of heavy equipment to and from the project site will be restricted to established roadways to minimize habitat disturbance. Project-related vehicles will observe a 20-mile-per-hour speed limit within construction areas, except on county roads and on state and federal highways.
6. The applicant will restore 0.11 acre (.04 ha) of temporarily affected aquatic snake habitat according to the *Guidelines for Restoration and/or Replacement of Giant Garter Snake Habitat* and the *Standard Avoidance and Minimization Measures During Construction Activities in Giant Garter Snake (Thamnophis gigas) Habitat* (included with the final Biological Opinion in Appendix H).
7. Permanent loss of giant garter snake habitat will be compensated for at a ratio of 3:1 at a USFWS approved mitigation site.

With implementation of these measures the project would result in a regional net increase in giant garter snake habitat and would not result in significant adverse effects on giant garter snake.

The following mitigation measures related to special-status fish species would be applied to the **Applicant Preferred Alternative – ASB Setback Levee Alternative, Intermediate Setback Levee Alternative, and Levee Strengthening Alternative**:

Mitigation measures for potential impacts to fisheries resources are based on consultation (formal and informal) and coordination with NMFS, USFWS, and DFG. The Corps and TRLIA and its representatives have participated in this consultation and coordination process. The consultation process considered site specific conditions and utilized accepted agency methods for assessing fishery impacts and providing mitigation measures typical for California's Central Valley. In December 2007, NMFS provided a letter to the Corps determining that the Applicant Preferred Alternative – ASB Setback Levee Alternative is not likely to adversely affect species under their jurisdiction that might occur in the project area. NMFS also concluded that the Applicant Preferred Alternative would not adversely affect Essential Fish Habitat for Pacific salmon. Receipt of this letter concluded consultation for the Applicant Preferred Alternative – ASB Setback Levee Alternative (see Appendix H).

#### **Mitigation Measure 3.9-b1: Implement Mitigation Measure 3.4-a, Prepare and Implement a Stormwater Pollution Prevention Plan**

To address potential fishery impacts related to sediment and turbidity, implement mitigation measures discussed in Section 3.4, "Water Quality" for construction related water quality effects. This mitigation measure requires preparation of a Stormwater Pollution Prevention Plan (SWPPP) detailing measures to control soil erosion and waste discharges from construction areas and submittal of a Notice of Intent to the Central Valley Regional Water Quality Control Board (RWQCB) for stormwater discharges associated with general construction activity. The SWPPP must identify grading and erosion control best management practices and specifications to avoid and minimize water quality impacts to the extent practicable. See Section 3.4 for the complete mitigation measure.

#### **Mitigation Measure 3.9-b2: Implement Mitigation Measure 3.5-a1: Evaluation of Soils, Identification of Hazardous Materials, Disposition of Topsoil**

Mitigation for fishery impacts related to potential borrow material contaminants would be the same as mitigation for potential for long term water quality effects discussed in Section 3.5, "Hazardous Materials." This mitigation measure requires TRLIA or its primary construction contractor to have a qualified hazardous materials specialist conduct on-site field screening of soil samples from the existing levee sections that would be used to fill borrow sites in the setback area. These soil samples will be visually screened for potential contamination at all depths. Field testing will be used to test for contaminants. If a qualified specialist determines that additional testing is necessary, laboratory analytical testing of soil samples may be performed. Material that is deemed unsuitable for use in the setback area floodplain will be hauled to an appropriate location outside of the setback area and/or made available for other approved uses. Topsoil that is stripped from borrow areas east of the setback levee will not be used to construct the setback levee. See Section 3.5 for the complete mitigation measure.

#### **Mitigation Measure 3.9-d1: Comply with Conditions of Streambed Alteration Agreement**

TRLIA shall comply with conditions set forth to protect streambed resources and fish and wildlife habitat in the streambed alteration agreement received from DFG (the agreement is duplicated in Appendix G, "California Department of Fish and Game, Permit Applications"). Conditions include requirements to record and report impacts on riparian vegetation and provision of replacement habitat if habitat removal occurs.

The following mitigation measure would be applied to the **Applicant Preferred Alternative – ASB Setback Levee Alternative and the Intermediate Setback Levee Alternative**.



**Mitigation Measure 3.9-d2: Comply with Conditions Set Forth in the Biological Assessments (BAs) Prepared for USFWS and NMFS and the USFWS Biological Opinion (BO) as Part of the ESA Section 7 Consultation Process.**

TRLIA shall comply with conditions set forth in the BAs prepared for USFWS and NMFS as part of the ESA Section 7 consultation process. These BAs are duplicated in Appendix H, “Correspondence Regarding Special-Status Species.” NMFS has provided a letter concurring that if measures included in the BA are implemented, the Applicant Preferred Alternative – ASB Setback Levee Alternative is not likely to adversely affect fisheries resources under the jurisdiction of the USFWS. This letter is provided in Appendix H. Formal consultation with USFWS has been completed. As described in Section 3.7, “Terrestrial Biological Resources,” additional conditions provided by USFWS as part of the final biological opinion (BO) are being implemented.

The following measures either duplicate or support those found in the BAs and the BO. TRLIA is already legally committed to implementing these measures through the CEQA EIR process. To address potential fish stranding issues, TRLIA and its primary contractors for engineering design and construction shall ensure that the following measures are implemented to minimize the potential for fish stranding in the levee setback area:

- (a) Plan and implement drainage improvements. TRLIA or its designated construction contractors, through a combination of grading and drainage improvements, shall minimize the potential for floodwater to pond in the levee setback area in such a way that substantial numbers of fish become stranded and consequently become exposed to hostile environments (warm water temperatures and increased predation).

As part of the development of the final design for the levee setback area, TRLIA or its representatives shall determine the specific topographic and hydrologic characteristics of the levee setback area and shall define the anticipated flooding regime (depth, duration, and extent of flooding), drainage patterns, and potential for fish stranding risks there. The final project design shall include recontouring as necessary to ensure complete drainage and provide fish passage back to the main river channel as flood flows recede from the levee setback area. Features with substantial stranding risk shall be identified for filling and/or grading.

Complete drainage is important to reduce the risk of stranding; however, maintaining some seasonal aquatic habitat in the levee setback area and/or hydrologic connectivity to the Feather River may also be important features if enhancement of fish habitat and production is selected as a management activity in the levee setback area.

Before the design of the levee setback area is finalized, TRLIA or its representatives shall obtain the approval of DFG and NMFS indicating that the planned drainage and grading features are sufficient to address concerns about fish stranding potential. The features of the levee setback area shall be constructed in accordance with the approved final design.

- (b) Monitor the success of the drainage features and adjust if necessary. A mitigation monitoring plan shall be developed and implemented by a qualified biologist on behalf of TRLIA and shall be approved by DFG and NMFS before degradation of the existing levee. This monitoring plan shall evaluate the effectiveness of the grading and drainage features in the levee setback area in reducing the risk of fish stranding and the stability of the drainage features and shall determine the need for maintenance or modification. The monitoring plan shall include provisions for remediation should the design of the levee setback area prove to be unsuccessful in preventing fish stranding. These measures shall include, as appropriate, such activities as regrading or filling depressions in the levee setback area.

The recommended monitoring scheme shall include annual monitoring for a period of 5 years following the removal of any part of the existing levee. Additional monitoring may be required for areas where remediation is necessary. Monitoring is recommended to include the following actions:

- ▶ Visual assessment of the levee setback area by a qualified biologist before the flood season (i.e., by October 31). This assessment should note any substantial changes in the overall structure since implementation of the final design for the area, including reestablishment of vegetation and the presence of “holes” or pits.
- ▶ A visual survey by a qualified biologist at the end of each event that floods the levee setback area (i.e., after the recession of waters that inundate the floodplain). This survey should identify whether there is any ponding that would result in fish stranding, or whether channels have formed that flow through completely to the low-flow channel of the Feather River.

Following each flood season (i.e., after April 16), a letter report shall be submitted to NMFS and DFG summarizing the overall condition of the floodplain area and any changes that have occurred from the previous year(s). If any remediation measures are required, they shall be outlined in the letter report, along with a schedule specifying when the remediation activities will occur. Appropriate remediation measures shall be implemented as soon as is practicable to minimize the potential for fish stranding while maintaining the desired habitat values (if habitat enhancement is included in the floodplain area) and hydraulic characteristics of the area.

The performance of the mitigation measure shall be considered successful if there is no isolated standing water and/or barriers to fish passage capable of resulting in substantial fish stranding following a flood event that inundates the levee setback area.

Implementation of planned floodplain drainage features would also provide enhanced habitat conditions for special-status fish species. Studies of the potential geomorphic effects of the Applicant Preferred Alternative – ASB Setback Levee Alternative floodplain drainage swale (which would also be incorporated into the Intermediate Setback Levee Alternative) have included modeling of minor high water events (e.g., 1-in-2 year flood event, 1-in-5 year flood event) that would result in limited inundation of portions of the levee setback area. In these circumstances, the water surface elevation in the Feather River increases sufficiently to cause floodwaters to “back up” into the proposed floodplain drainage swale (Phillip Williams & Associates 2008b). The modeled water surface elevation in the Feather River at the location of the drainage swale is within approximately 1 foot of inundating a substantial amount of the new floodplain. Modeling results show that for a modest highwater event (7,373 cfs), waters from the Feather River would discharge into the floodplain swale and other low-gradient ditches for up to 1.5 miles, thereby inundating approximately 30 acres and providing floodplain habitat for various fish species. A slightly larger estimated discharge event (8,414 cfs) would discharge into the floodplain swale for a similar distance, but it would inundate approximately 74 acres. These are general approximations, however, both estimates highlight the potential for removal of the existing levee and enhancement of the drainage swale to allow for re-creation of natural floodplain processes and related micro-habitat conditions in the lower part of the levee setback area.

## 3.10 CULTURAL RESOURCES

The following analysis addresses direct effects of the Applicant Preferred Alternative – Above Star Bend (ASB) Setback Levee Alternative (also referred to as the “Applicant Preferred Alternative”) and other alternatives. Potential indirect effects of the Applicant Preferred Alternative and other alternatives are addressed in Chapter 4.0, “Cumulative and Growth-Inducing Effects.” For example, for an evaluation of the effects of increased susceptibility of previously undiscovered cultural resources to damage or vandalism from development potentially facilitated by the Applicant Preferred Alternative and other action alternatives, see Section 4.1.2.8, “Cultural Resources.” For an evaluation of the combined effects on cultural resources from implementation of past, present, and future projects in the region, see Section 4.2.4.6, “Cultural Resources.”

### 3.10.1 EXISTING CONDITIONS

#### 3.10.1.1 REGIONAL SETTING

##### Prehistoric Context

Generally speaking, the archaeology of Yuba County is included within the broad framework established by archaeologists for the Sacramento Valley. The following summary of the prehistoric cultural sequence is drawn primarily from Moratto (1984).

Reliable evidence of early occupation in the northern Sacramento Valley dates after 8,000 years before present (B.P.) (Johnson et al. 1984). The Borax Lake Pattern of the Lower Archaic Period (8000–5000 B.P.) is defined by certain material items such as wide-stemmed projectile points, hand-stones, milling stones, and bowl mortars. The Late Borax Lake Pattern, which archaeologists date to the Middle Archaic Period (5000–2500 B.P.), represents a continuation of the earlier Borax Lake Pattern. Late Borax Lake is distinguished from the earlier manifestation by a greater diversity of projectile point types and use of the spear thrower (atl-atl).

During the Upper Archaic Period (2500–1500 B.P.), early cultures of the Sacramento Valley exhibited a shift to predominant use of mortars and pestles instead of hand-stones and milling stones. This change may reflect an increased reliance on acorns as a staple food by the valley’s indigenous population.

The Emergent Period (1500–200 B.P.) in Sacramento Valley prehistory is represented by the Shasta Aspect of the Augustine Pattern. Shasta Aspect archaeological sites are typically located near watercourses, contain semi-subterranean dwellings and new artifact types, and reflect a hunting and gathering economy focused on acorn procurement. Moratto (1984) proposed that the Shasta Aspect represents the influence and intrusion of peoples from farther north in California. Toward the end of this period, extensive Euroamerican influences began to adversely affect native cultures throughout California.

##### Ethnographic Context

According to archaeological traces, documentary evidence, and oral history, the project area is located within the lands traditionally occupied by the Nisenan, or Southern Maidu. The western boundary of Nisenan territory was the western bank of the Sacramento River. The eastern boundary was “the line in the Sierra Nevada mountains where the snow lay on the ground all winter” (Littlejohn 1928).

Nisenan settlement locations depended primarily on elevation, exposure, and proximity to water and other resources. Permanent villages were usually located on low rises along major watercourses. Village size ranged from three living structures to up to 40 or 50. Dwellings consisted of domed structures covered with earth and tule reeds or grass and usually measured 10–15 feet in diameter. Simple brush shelters were used in the summer and at temporary camps during food gathering rounds. Larger villages often had semi-subterranean dance houses that

were covered in earth and tule reeds or brush. Another common village structure was a granary, which was used for storing acorns (Wilson and Towne 1978).

## **Historical Context**

### ***Exploration and Settlement***

Europeans first explored the area that is now Yuba County in 1808, when Spanish explorer Gabriel Moraga led an expedition from Mission San Jose to the northern Sacramento Valley (Abeloe 1966, Gordon 1988). The earliest Euroamerican settlement in what is now Yuba County coincided with the establishment of land grants by the Mexican government. John A. Sutter obtained the first such grant in the region in 1841. Sutter's New Helvetia Rancho encompassed lands on the left bank of the Feather River, including what is now the FRLRP project area (General Land Office 1859).

### ***Mining***

Beginning in 1849, prospectors and entrepreneurs overran the streams of the Sierra Nevada in search of riches. Miners initially established their claims and workings on watercourses and then gradually worked back from the flats adjacent to streams, ridges, and hillsides. By 1857, hydraulic mining began to replace the smaller-scale placer methods and extracting placer gold was no longer restricted to the immediate stream channel and bars. Debris from hydraulic operations destroyed or buried many of the older mining camps (Hoover, Rensch, and Rensch 1966).

Although there are no records of large-scale mining in the project vicinity, the industry had considerable indirect effects on historical developments in the region. The diggings and mines in the nearby foothills dramatically increased economic activity in the region, leading to increased prosperity and the rise of larger and more numerous support industries such as cattle ranches and farms.

Meanwhile, the deposition of silt in Central Valley watercourses, including the Yuba and Feather Rivers, resulted in the raising of the riverbeds and increased flooding. Although the city of Marysville (immediately upstream of the FRLRP project area) experienced high waters every few years, there were no disastrous floods until December 1861 (Thompson & West 1879). As the waters receded, they left a deposit of 11–72 inches of sand on the bottomlands adjacent to the rivers. After 1861, catastrophic floods became more common, prompting the development of a levee system and beginning the process of land reclamation for agricultural purposes. In later years, other flood-control efforts were initiated as described below to further alleviate negative impacts on water quality and on the scale and frequency of seasonal flooding.

### ***Agriculture and Flood Control***

Initial efforts at flood control in the Central Valley were usually uncoordinated and consisted of small levees and drains constructed by individual landowners. These features proved insufficient to protect cultivated land, and much of the acreage east of the Feather River in the FRLRP project area remained marshland that was unsuited for agriculture (U.S. Geological Survey 1910, 1911). In 1866 responsibility for swamp and overflow land was given to the individual counties in California. If a landowner could certify that he or she had spent at least \$2 per acre in reclamation, the county would refund the purchase price of the property to the owner. Speculators took advantage of this program and a period of opportunistic and often-irrational levee building followed (Thompson 1958, McGowan 1961).

In response to the flood of 1907, citizens of Yuba County formed RD 784. RD 784 built substantial levee and drainage systems to restrain floodwaters from the Yuba, Feather, and Bear Rivers and the Western Pacific Interceptor Canal and incorporated levees built by various landowners.

In 1911, the California Legislature established the Reclamation Board (subsequently renamed the Central Valley Flood Protection Board [CVFPB]) to exercise jurisdiction over reclamation districts and levee plans. That year, the state approved and began implementation of the Sacramento River Flood Control Project (SRFCP). The ambitious project included the construction of levees, weirs, and bypasses along the Sacramento River and its tributaries to channel floodwaters away from population centers. Under the SRFCP, new reclamation districts were created and existing districts, such as RD 784, were placed under the jurisdiction of the CVFPB (JRP Historical Consulting Services 1994).

### **3.10.1.2 LOCAL SETTING**

A review of historic maps indicates the potential for the presence of archaeological deposits associated with several historic structures in or near FRLRP Segment 2. The 1859 General Land Office Plat Map for Township 14 North, Range 3 East, depicts fields and a fence along the east side of the Feather River in Segment 2. A north-south road extending from the Feather River north toward Marysville appears to be at least partially located within the project area and is depicted on a 1849 map of the Sacramento Valley (Derby 1849). An Indian rancheria in the project vicinity is labeled simply “Indians and Sutter’s Hook Farm.”

### **Cultural Resources in the Project Area**

#### ***Previous Archaeological Investigations***

The files maintained at the North Central Information Center (NCIC) of the California Historical Resources Information System contain information on previously conducted archaeological investigations that occurred within 1/4 mile of the project area. The findings of these past investigations are described briefly below.

#### ***Resources Previously Identified within the Project Area***

Cultural resources previously identified within FRLRP project Segment 2 are described below.

In 1953, archaeologists from the University of California, Berkeley (UC Berkeley) conducted salvage excavations at the request of a landowner who proposed to build a dehydrator on a prehistoric village site identified as CA-Yub-5 (located in what is now project Segment 2), as documented by Elsasser and Baumhoff (1953). The UC Berkeley archaeologists removed the remains of several individuals and associated grave goods from the eastern portion of the site.

The records of the burials themselves were minimal; however, grave goods included banjo ornaments, spire-lopped Olivella (olive snail) shell beads, square-cut Olivella shell beads, Haliotis (abalone) shell ornaments, obsidian projectile points, and bone awls. No data recovery excavations were completed. Based upon recovered shell beads, the investigators indicated that the site appears to date from the Middle Archaic to the Upper Archaic Period. While not providing evidence to substantiate their claim, the investigators remarked that more than half of the 6,000-square-foot site had been destroyed before the salvage excavation by pothunters, who reportedly had excavated some 30 burials before 1953. In 2002, Jones & Stokes archaeologists performing surveys in the area for the Y-FSFCP confirmed the recorded location of site CA-Yub-5 and made additional observations, as described below (Yuba County Water Agency 2003c).

Evaluation of RD 784 and neighboring RD 1001 was conducted by JRP Historical Consulting Services in 1994 (JRP Historical Consulting Services 1994). While RD 784 is historic, none of the reclamation-related features were recommended as eligible for listing in the National Register of Historic Places (NRHP), individually or as a system, because of a lack of integrity dating to the period of significance.

In 2002, archaeologists with Jones & Stokes inventoried a large portion of what is now the FRLRP project area at a reconnaissance level (50-meter [164-foot] parallel transects) as part of the Y-FSFCP effort. More intense (25-meter [82-foot]) parallel transects were used for a small portion of the project area consisting of

approximately one mile of the Feather River levee north of Ella Road in project Segment 2 and adjacent orchards to the east. Site CA-Yub-5 was relocated. The archaeologists noted that a four-foot-high mound is present on the site. No artifacts were observed on the surface, but a foot-thick midden layer and fire-cracked rock were observed in a cut bank on the western edge of the site, overlain by one to three feet of sand. Disturbances consisted of a dirt road along the western edge of the site, a barn, and a walnut orchard currently located onsite. Five historic resources were identified within project Segment 2 during this investigation:

- ▶ Feather River levee (C-YCWA-3): A 25-foot-high earthen berm along the east side of the Feather River with a 14- to 16-foot-wide road along the 20-foot-wide crown.
- ▶ Barn (C-YCWA-4): A wood frame structure built sometime in the early 1920s. In 1997, floodwaters lifted the barn off its foundation and twisted the structure into its current dilapidated condition.
- ▶ House and barn (C-YCWA-5): A single-story house with a concrete slab foundation and concrete masonry unit walls and a carport at the south end of the building, and a two/three-story rectangular structure located north of the house.
- ▶ Migrant worker camp (C-YCWA-6): The remains of a migrant worker camp that apparently consisted of two large bunkhouses, a bathhouse, and a fourth building that may have been a mess hall.
- ▶ Messick Lake Ditch/Lateral 6 (C-YCWA-7): An earthen ditch that extends northwest and south from Messick Lake, crossing Anderson Avenue via corrugated steel pipe.

Jones & Stokes (Yuba County Water Agency 2003c) noted that the RD 784 irrigation features and the Feather River levee do not represent unique examples of reclamation technology and do not retain integrity to the period in which they achieved significance, having been altered over time. The other features were found to lack distinctive characteristics that would potentially qualify them for NRHP or California Register of Historic Resources (CRHR) listing. Therefore, these resources were considered not to be eligible for NRHP or CRHR listing.

## ***Results of Current Investigations within the Area of Potential Effects***

### **Methods**

During numerous site visits through 2006 and 2007, EDAW archaeologists conducted pedestrian surveys in Segment 2 along the proposed and intermediate setback levee alignments and in the setback area corresponding to the APE. Survey methods and results are provided in *Cultural Resources Assessment for the Feather River Levee Repair Project, Segment 2 – Levee Setback, Yuba County* (TRLIA 2007) (document not provided in an appendix due to the sensitive nature of information related to locations of cultural resources sites). This document has been provided to the U.S. Army Corps of Engineers (Corps) to assist with NHPA Section 106 compliance required in support of the CWA 404 permitting process. Additional cultural resources surveys were conducted in 2007 on a potential borrow site along the east side of the proposed setback levee north of Anderson Avenue.

Surveys of the Area of Potential Effects (APE) were conducted using methods consistent with the Secretary of the Interior's Standards and Guidelines for Identification of Cultural Resources (48 Code of Federal Regulations [CFR] 44720–44723) and recordation of resources followed the guidelines outlined in Instructions for Recording Historical Resources (California Office of Historic Preservation 1995). The surveys consisted of parallel transects with spacing between 25 and 15 meters. Periodic removal of vegetation was conducted in areas with moderate grass cover to provide an adequate sample of the ground surface. All areas of rodent disturbance, irrigation ditches, and other cut banks were inspected for the presence of subsurface cultural deposits. Surveyors revisited each of the previously recorded sites within the APE area and assessed their current condition. Changes that may have occurred since original recordation were noted. All structures more than 45 years old were documented.



California Department of Parks and Recreation (DPR) Series 523 forms were prepared as necessary. All sites and structures were photographed in their natural setting.

In addition, limited site testing was performed to determine the extent of cultural materials associated with prehistoric site CA-YUB-5. The methods and summary of findings resulting from these test excavations are presented in *Cultural Resources Assessment for the Feather River Levee Repair Project, Segment 2 – Levee Setback, Yuba County* (TRLIA 2007).

Prior to conducting fieldwork, EDAW consulted with the Native American Heritage Commission (NAHC) and the Enterprise Rancheria of Maidu Indians of Oroville. A response from the NAHC indicated that a record search of the sacred land files failed to indicate the presence of Native American cultural resources in the immediate project area. The Enterprise Rancheria of Maidu Indians expressed concern about the project and its potential to affect sensitive prehistoric resources. EDAW subsequently coordinated with a representative of the designated Most Likely Descendant (MLD) in an effort to determine whether traces of the prehistoric site CA-Yub-5 extend into the footprint of the proposed setback levee.

## Results

As described above, a total of six previously identified resources have been identified within or directly adjacent to the APE (CA-Yub-5, C-YCWA-3, C-YCWA-4, C-YCWA-5, C-YCWA-6, and CYCWA-7). EDAW archaeologists located all previously identified resources. Detailed mapping of CA-Yub-5 was completed; no further disturbances of this site, beyond those noted by Jones & Stokes (Yuba County Water Agency 2003c), were observed.

A single isolated find in the APE was documented during this field investigation. The isolated find consisted of a fragmented piece of sun-colored amethyst glass, observed within the proposed intermediate setback levee alignment. This fragment is chipped along all of the margins and is eroded, indicating that it has been transported by fluvial processes, possibly during one or more of the historic flooding episodes. While this type of glass was in use from ca. 1880 to the late 1910s, it lacks association and further data potential.

Various buildings were also identified in the levee setback area. Many are not considered eligible for inclusion on the NRHP or CRHR because they are less than 45 years old. The remainder (see Table 3.8-1) are not considered eligible because neither their architecture or historic value meet NRHP or CRHR criteria (see *Cultural Resources Assessment for the Feather River Levee Repair Project, Segment 2 – Levee Setback, Yuba County* [TRLIA 2007c] for more detail on these structures).

### **Summary of Cultural Resources in the Project Area**

Table 3.10-1, “Summary of Cultural Resources in the Project Area,” presents a list of previously identified and newly identified resources in and adjacent to FRLRP Segment 2, along with the NRHP and CRHR eligibility status of each resource.

## **3.10.2 ENVIRONMENTAL CONSEQUENCES**

A project alternative would have an adverse effect on cultural resources if it would alter any characteristics that make the cultural resource eligible for the NRHP. If a property is determined to be eligible for the NRHP, it is considered to be significant. These adverse effects (significant impacts) include, but are not limited to:

- ▶ substantial adverse changes in the significance of a historical resource;
- ▶ substantial adverse changes in the significance of an archaeological resource; or
- ▶ disturbance of any human remains, including those interred outside formal cemeteries.

| <b>Table 3.10-1</b><br><b>Summary of Cultural Resources in the Project Area</b> |           |             |                                                  |                      |
|---------------------------------------------------------------------------------|-----------|-------------|--------------------------------------------------|----------------------|
| Project Segment                                                                 | Site      | Association | Description                                      | NRHP/CRHR Status     |
| <b>Previously Identified Resources</b>                                          |           |             |                                                  |                      |
| 2                                                                               | CA-Yub-5  | Prehistoric | Village/burials                                  | Potentially eligible |
| 2                                                                               | C-YCWA-3  | Historic    | Levee                                            | Not eligible         |
| 2                                                                               | C-YCWA-4  | Historic    | Barn                                             | Not eligible         |
| 2                                                                               | C-YCWA-5  | Historic    | House and barn                                   | Not eligible         |
| 2                                                                               | C-YCWA-6  | Historic    | Work camp                                        | Not eligible         |
| 2                                                                               | C-YCWA-7  | Historic    | Canal                                            | Not eligible         |
| <b>Newly Identified Resources</b>                                               |           |             |                                                  |                      |
| 2                                                                               | Isolate 1 | Historic    | Glass Fragment                                   | Not eligible         |
| 2                                                                               | FR2       | Historic    | House and shop                                   | Not eligible         |
| 2                                                                               | FR3       | Historic    | Shop                                             | Not eligible         |
| 2                                                                               | FR4       | Historic    | Barn                                             | Not eligible         |
| 2                                                                               | FR5       | Historic    | Complex of eight residences and one storage shed | Not eligible         |
| 2                                                                               | FR6       | Historic    | Bar and residence                                | Not eligible         |

The following analysis addresses direct effects of the Applicant Preferred Alternative – ASB Setback Levee Alternative and other alternatives. Potential indirect effects of the Applicant Preferred Alternative and other alternatives are addressed in Chapter 4.0, “Cumulative and Growth-Inducing Effects.” For example, for an evaluation of the effects of increased susceptibility of previously undiscovered cultural resources to damage or vandalism from development potentially facilitated by the Applicant Preferred Alternative and other action alternatives, see Section 4.1.2.8, “Cultural Resources.” For an evaluation of the combined effects on cultural resources from implementation of past, present, and future projects in the region, see Section 4.2.4.6, “Cultural Resources.”

### 3.10.2.1 ASB SETBACK LEVEE ALTERNATIVE

#### AP Impact 3.10-a: Adverse Changes in the Significance of a Historical or an Archaeological Resource

Archaeological site CA-Yub-5, a prehistoric village site, is located in the vicinity of the setback levee alignment. This is the only known site potentially eligible for the NRHP or CRHR in the APE. Early in the design process, the proposed setback levee alignment was moved several hundred feet east to avoid this site. Based on site testing performed to delineate the eastern limits of any potentially important deposit of cultural materials that may be associated with CA-Yub-5, construction of the setback levee in its current alignment would not disturb site CA-Yub-5. However, it is possible that additional scattered materials, such as specimens of fire-affected rock, will be found in the levee right-of-way during construction.

Degradation of the existing levee after the setback levee is complete, and subsequent flooding of the setback area could have a substantial adverse effect on CA-Yub-5 if the site is exposed to erosive forces from flood flows or by inundation. If an intact cultural deposit exists at the site, it could be indirectly disturbed by periodic seasonal flooding, especially along the exposed cut bank of the remnant river terrace where the midden deposit has been observed.

Approximately 90 acres of the approximately 1,600 acre APE have not yet been adequately inventoried because either access was not available or vegetative ground cover was too dense. Undocumented and potentially

significant cultural resources may be present in these areas and could be damaged by project-related ground disturbing activities.

#### **AP Impact 3.10-b: Disturbance of Previously Unidentified Historical and Archaeological Resources or Human Remains**

Previously unidentified buried archaeological resources could be encountered during ground-disturbing activities, such as site preparation, grading, and excavation. Archaeological resources so encountered during construction could be damaged or destroyed. If any such resources are considered significant cultural resources, their damage or destruction would be considered a substantial adverse effect.

It is possible that undiscovered buried human remains could be unearthed and damaged or destroyed during ground-disturbing activities. Damage to or destruction of human remains during project construction or other project-related activities would be considered a substantial adverse effect.

#### **3.10.2.2 INTERMEDIATE SETBACK LEVEE ALTERNATIVE**

##### **ISL Impact 3.10-a/b: a) Adverse Changes in the Significance of a Historical Resource or an Archaeological Resource; b) Disturbance of Previously Unidentified Historical and Archaeological Resources or Human Remains**

The Intermediate Setback Levee Alternative would have impacts very similar to those described above for the Applicant Preferred Alternative – ASB Setback Levee Alternative (also referred to as the “Applicant Preferred Alternative”). The portion of the Intermediate Setback Levee alignment in the vicinity of site CA-Yub-5 overlaps with the Applicant Preferred Alternative alignment. Therefore, potential for disturbance of archaeological resources at this site during setback levee construction and later inundation would be the same. Both the Intermediate Setback Levee Alternative and the Applicant Preferred Alternative have unsurveyed areas, and both have the potential to disturb undiscovered cultural resources, including human remains.

#### **3.10.2.3 LEVEE STRENGTHENING ALTERNATIVE**

##### **LS Impact 3.10-b: Disturbance of Previously Unidentified Historical and Archaeological Resources or Human Remains**

The Levee Strengthening Alternative would require far less disturbance of land than under the Applicant Preferred Alternative – ASB Setback Levee Alternative. The majority of the ground-related construction activities associated with this alternative would be located within the existing levee easement, areas to receive berms, borrow sites, and areas associated with the relocation of the pump station. The Levee Strengthening Alternative would therefore have less likelihood of disturbing unknown archaeological resources than the Applicant Preferred Alternative, although the potential does exist for an adverse effect. No known cultural resources are located within the existing levee system or the areas associated with the relocation of the pump station, and known cultural resources do not exist in the areas preliminarily identified as potential borrow sites; however, the potential exists for the Levee Strengthening Alternative to result in adverse affects to previously unidentified cultural resources.

#### **3.10.2.4 NO-ACTION ALTERNATIVE**

If no permissions were granted to alter the existing levee or discharge dredged or fill material into waters of the United States, construction work necessary to completely repair the Segment 2 levee would not be allowed, and no ground-disturbing activities would occur that might adversely affect known or currently undiscovered cultural resources. Under these conditions, heavy underseepage and loss of foundation soils would be expected to continue and the threat of another levee failure would remain. Under the No-Action Alternative, it is possible that localized levee repairs (e.g., correction of identified waterside erosion sites) could be authorized under the federal Clean

Water Act (CWA) Nationwide Permit (NWP) #3. This work would be unlikely to cause any significant impacts to cultural resources.

There are no known archaeological sites near the existing levee that are likely to be highly eroded as a result of the hydraulic forces following a levee break. However, historic buildings in the area protected by the Segment 2 levee could be irreversibly damaged by a flood event resulting from a levee failure. Previously undiscovered cultural resource deposits could be inadvertently damaged during large scale emergency cleanup and repair work following a levee breach.

### 3.10.3 MITIGATION

All mitigation measures shall be specified in a Historic Property Treatment Plan (HPTP) prepared in accordance with the terms set forth in a Memorandum of Agreement (MOA). On July 22, 2008, an MOA was executed between the Corps, Three Rivers Levee Improvement Authority (TRLIA), and the State Historic Preservation Officer (SHPO). This MOA constitutes compliance with Section 106 of the National Historic Preservation Act of 1966, as amended. The HPTP was submitted to the Corps and the SHPO on August 21, 2008. Corps staff has indicated their concurrence with the HPTP, and no comments were received from the SHPO. A draft Cultural Resources Construction Monitoring and Inadvertent Discovery Plan (Construction Monitoring Plan) was also prepared to address required actions should previously unidentified cultural resources be uncovered during project construction. Once approved by the Corps and the SHPO, the Construction Monitoring Plan will be part of the HPTP. The HPTP specifies all mitigation measures that would be applied to the adopted action alternative whether that be the **Applicant Preferred Alternative – ASB Setback Levee Alternative, Intermediate Setback Levee Alternative, or Levee Strengthening Alternative**. These measures would include, at a minimum, those described below.

The following mitigation measures would be applied to the **Applicant Preferred Alternative – ASB Setback Levee Alternative and the Intermediate Setback Levee Alternative**.

#### **Mitigation Measure 3.10-a1: Prepare a Memorandum of Agreement (MOA) between the Corps, TRLIA and the SHPO, and Implement Measures in the Attached Historic Property Treatment Plan (HPTP) to Protect Site CA-Yub-5 during Project Construction**

As a result of the subsurface testing program, it appears that any significant portions of CA-Yub-5 that are still present are contained within and immediately adjacent to the existing mound, but do not extend into the proposed setback levee right-of-way. However, subsurface testing offers only a limited view of underground deposits over a large area. Significant subsurface cultural deposits or human remains may have been disturbed and redeposited over time within the area proposed for construction activity and isolated resources could be encountered during project construction. A human burial, for example, may occur in an area measuring little more than several square feet. The chances of encountering one randomly during archaeological testing are low; the odds are much higher with grading equipment removing large quantities of soil. Consequently, the potential for direct effects during setback levee construction will be minimized through execution of the MOA, which includes consultation with tribal representatives (including Enterprise Rancheria), prepared to satisfy the requirements of Section 106 of the NHPA in consultation with the Corps, TRLIA and the SHPO. An HPTP has been prepared in accordance with the terms specified in the MOA, and mitigation measures are identified to address potential effects on cultural resources. These measures include the following requirements:

- (1) Trees should be left in place and understory vegetation be allowed to grow to the extent practical on the CA-Yub-5 mound itself and within the area extending 500 feet north of the northernmost point of the mound, 200 feet east of the easternmost point of the mound, 100 feet south of the southernmost point of the mound, and west to the edge of the elevated terrace.

In the portion of the levee footprint that is within these boundaries, where trees and root systems must be removed by TRLIA and its contractors, mechanical tree removal should be completed in the most practicable manner that offers the greatest opportunity for preserving any isolated cultural resource materials that may be encountered during this process. Therefore, it is recommended that a backhoe be used for focused, controlled excavation around each tree stump prior to removal to afford a view of the root ball. This process should be closely monitored by an archaeologist and a Native American monitor. Tree removal would be followed by grading in shallow lifts, as described in measure (2) below. Different tree removal procedures would be used in the toe access corridor and other parts of the area within the boundaries described above, as follows.

Trees that would be removed from within these boundaries but outside of the levee footprint should be cut and the stumps ground. In these areas, the root systems should be left in place to the extent practicable to minimize the extent of ground disturbance. This activity should also be monitored by an archaeologist and a Native American monitor.

It should be noted that the private owner of the parcel containing site CA-Yub-5 removed many of the trees on and adjacent to site CA-Yub-5 during the spring of 2008. The landowner was apprised of the above mitigation approach for tree removal and asked by TRLIA to follow these measures; however, TRLIA had no mechanism to require compliance. Subsequent visits to the site in spring/summer 2008 indicate that although some trees were cut at the ground surface as suggested, others had the root balls physically removed by heavy equipment. For remaining trees, TRLIA shall fully implement the tree removal methodology described above.

- (2) A tracked excavator with a flat blade on the bucket should be used to gradually grade the levee footprint within the area extending 500 feet north of the northernmost point of the CA-Yub-5 mound, 200 feet east of the easternmost point of the mound, and 100 feet south of the southernmost point of the mound. This activity should be monitored by an archaeologist and a Native American monitor. The grading should continue to the depth that will be needed to construct the levee footprint. If a belly scraper has to be used instead of an excavator, the scraper should remove soils in a maximum lift of 3 inches.
- (3) Mechanical grading within the boundaries of the area described in measure 2 above should be done as early as possible in the overall project construction process to allow for adequate time for investigation and appropriate treatment of significant site deposits or human remains, should any be encountered, without causing construction delays.
- (4) The waterside levee access easement parallel to the mapped extent of CA-Yub-5 should be built up with imported soils to a depth of at least 1 foot to protect any near-surface artifacts or features that could be affected by construction or maintenance machinery.

As mentioned above, upon removal of portions of the existing levee, CA-Yub-5 could be exposed to potential indirect erosional effects resulting from seasonal flooding. As part of project design, additional modeling of hydrologic and geomorphic conditions in the setback area is being conducted. Implementation of the following measures to ensure protection of the site will be carried out through the MOA that has been executed between the Corps, TRLIA, and the SHPO. The MOA specifies that an HPTP be developed that addresses mitigation measures. An HPTP has been prepared in accordance with the terms specified in the MOA and was submitted to the Corps and the SHPO on August 21, 2008. Consultation with tribal representatives has included submittal of the HPTP to the Enterprise Rancheria; at the time this final environmental impact statement was prepared, no formal comments had been received. Mitigation measures include, but may not be limited to:

- (1) Engineered features and/or strategic plantings designed based on anticipated hydrologic and geomorphic conditions to protect the site from erosion and scour from surface flows and from human disturbance to be installed before portions of the existing levee are removed. For example, riprap and/or dense vegetation (e.g., blackberry, wild rose, poison oak) may be used along the river terrace forming the western boundary of the site to prevent erosion and the loss of archaeological deposits.

- (2) Development of a monitoring plan to ensure that the above measures are effective in preventing the archaeological deposits from being further compromised by seasonal flooding events.
- (3) Adverse effects caused by periodic inundation have not yet been evaluated. The HPTP will provide for archaeological and geomorphic investigations to determine if deposits at CA-Yub-5 will be adversely affected by increased erosion or inundation. If hydrologic/geomorphic studies determine that the site will be inundated by periodic flooding, archaeological testing will be conducted to determine if the archaeological deposit:
  - (a) has been flooded in pre-historic times
  - (b) contains archaeological materials that would be adversely affected by periodic inundation. If archaeological testing determines that periodic inundation would cause adverse effects to the archaeological deposit, a treatment plan will be developed in consultation with the Corps, TRLIA, Native Americans and the SHPO to reduce adverse effects to a level that is not significant. The treatment plan may include a data recovery plan. Treatment and data recovery plans would be incorporated into the HPTP.

All measures specified in the MOA and the HPTP will be carried out in consultation with Native American tribal representatives prior to any ground disturbance. The general mitigation approach described above has been discussed with representatives from the Enterprise Rancheria, who concur with the concepts of retaining site CA-Yub-5 in its current location, avoiding/minimizing disturbance to the site, and ensuring protection of the site through engineered features and vegetation planting.

#### **Mitigation Measure 3.10-a2: Complete Surveys of the Area of Potential Effects**

All portions of the APE that have not been previously surveyed for cultural resources shall be surveyed before potential direct disturbance by project construction. The surveys shall be conducted at a time when ground visibility is adequate. If cultural resources are identified as a result of the surveys, a professional archaeologist shall evaluate the significance of the finds and shall recommend appropriate mitigation measures for significant resources in coordination with the Corps and the SHPO pursuant to the stipulation of the MOA and HPTP. TRLIA shall implement feasible mitigation determined by the Corps and the SHPO to be necessary.

#### **Mitigation Measure 3.10-a3: Provide Construction Monitoring**

Older alluvial surfaces characterized by the Riverbank and Modesto Formations are present within the proposed setback levee right-of-way within one-quarter mile of CA-Yub-5, north of Star Bend and south of Ella Avenue. Where these surfaces are exposed in cut banks, they are overlain by up to 3 feet of sand and silt sediments deposited during seasonal flooding of the Feather River prior to construction of the existing levee that may be obscuring archaeological deposits from identification during surface surveys. These areas provide conditions similar to those found at CA-Yub-5 in that they are located at the transition between stream channel deposits and the older formations, and have a high probability of containing sites of prehistoric occupation. Because of the potential for buried sites to be present within this portion of the project area, it is recommended that ground-disturbing activities associated with construction of the setback levee in this area be monitored by a qualified professional archaeologist accompanied by a Native American consultant/monitor. All finds discovered during the monitoring process will be addressed in accordance with the guidelines outlined in the "Unanticipated Finds" section below and the HPTP prepared pursuant to the MOA.



The following mitigation measure would be applied to the **Applicant Preferred Alternative – ASB Setback Levee Alternative, Intermediate Setback Levee Alternative, and Levee Strengthening Alternative.**

**Mitigation Measure 3.10-b1: In the Event of Unanticipated Finds, Halt Construction and Notify the Proper Authorities**

Standard survey methods were used to identify resources that may be located within the project area. It is possible that subsurface cultural deposits are present. If unrecorded cultural resources are identified during project implementation, all potentially destructive work in the vicinity of the find shall cease until a qualified archaeologist can assess the significance of the find and, if appropriate, provide recommendations for treatment pursuant to the provisions of 36 CFR 800.13. Subsurface prehistoric resources may take the form of stone tool and tool fragments, rock concentrations, burned and/or unburned shell or bone, and/or darkened sediments containing some of the above-mentioned constituents. Historic period deposits include fragments of glass, ceramic and metal objects, milled and split lumber, and structure and feature remains such as building foundations and dumps.

If human remains are found, the California Health and Safety Code (HSC) requires that excavation be halted in the immediate area, and that the county coroner be notified to determine the nature of the remains. The coroner is required to examine all discoveries of human remains within 48 hours of receiving notice of a discovery on private or state lands (HSC Section 7050.5[b]). If the coroner determines that the remains are those of a Native American, he or she must contact the NAHC by phone within 24 hours of making that determination (HSC Section 7050.5[c]).

The responsibilities of the NAHC for acting upon notification of a discovery of Native American human remains are identified within the California Public Resources Code (PRC) (Section 5097.9). The NAHC is responsible for immediately notifying the person it believes is the MLD of the Native American remains. With permission of the legal landowner(s), the MLD may visit the site and make recommendations regarding the treatment and disposition of the human remains and any associated grave goods. This visit should be conducted within 24 hours of their notification by the NAHC (PRC Section 5097.98[a]). If an agreement for treatment of the remains cannot be resolved satisfactorily, any of the parties may request mediation by the NAHC (PRC Section 5097.94[k]). Should mediation fail, the landowner or the landowner's representative must re-inter the remains and associated items with appropriate dignity on the property in a location not subject to further subsurface disturbance (PRC Section 5097.98[b]). Reburial of any human remains that may contain important information about prehistory shall be considered an adverse and significant effect if that information cannot be recovered.

**Mitigation Measure 3.10-b2: Provide Training to Construction Personnel in Identification of Cultural Deposits and Human Remains**

Because of the high sensitivity of portions of the project area for the potential of subsurface cultural deposits, including human remains, construction personnel shall receive preconstruction training in the identification of cultural deposits and human remains.

## 3.11 AIR QUALITY

The following analysis addresses direct effects of the Applicant Preferred Alternative – Above Star Bend (ASB) Setback Levee Alternative (also referred to as the “Applicant Preferred Alternative”) and other alternatives. Potential indirect effects of the Applicant Preferred Alternative and other alternatives are addressed in Chapter 4.0, “Cumulative and Growth-Inducing Effects.” For example, for a discussion of the effects air quality emissions from development potentially facilitated by the Applicant Preferred Alternative and other action alternatives, see Section 4.1.2.9, “Air Quality.” For an evaluation of cumulative air quality effects resulting from the construction and operation of past, present, and future projects see Section 4.2.4.7, “Air Quality.”

### 3.11.1 EXISTING CONDITIONS

#### 3.11.1.1 OVERVIEW

The Feather River Levee Repair Project (FRLRP) project site is in Yuba County, which is in the Northern Sacramento Valley Air Basin (NSVAB). The NSVAB consists of Butte, Colusa, Glenn, Shasta, Sutter, Tehama, and Yuba Counties. Air quality in Yuba County is regulated by the U.S. Environmental Protection Agency (EPA), California Air Resources Board (ARB), and the Feather River Air Quality Management District (FRAQMD). Ozone, carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>), sulfur dioxide (SO<sub>2</sub>), particulate matter (PM), and lead are the most prevalent air pollutants known to be deleterious to human health. These pollutants are commonly referred to as “criteria air pollutants.” Ozone, typically associated with poor air quality, is not emitted directly into the air, but is formed through a series of chemical reactions between reactive organic gases (ROG) and oxides of nitrogen (NO<sub>x</sub>) in the presence of sunlight. Motor vehicles and stationary industrial sources are major sources of emissions of both ROG and NO<sub>x</sub>, which are also referred to as ozone precursors.

#### 3.11.1.2 AIR POLLUTANT SOURCES AND CONCENTRATIONS

Approximately 60–70% of the air pollution in the FRAQMD area comes from mobile sources, which includes on-road and off-road motor vehicles (including cars, trucks, planes, trains, tractors, combines, buses, motorcycles, and boats). The remaining 30–40% of the air pollution in the FRAQMD area is a result of stationary sources that include agricultural operations, open burning of vegetative wastes, wood burning for residential heating, manufacturing industries, electric generation industries, diesel backup generators, retail gasoline and local bulk distribution facilities, auto body shops, dry cleaners, landfills, other human-made sources that emit air contaminants, and naturally occurring sources (including biological and geological sources, wildfires, and windblown dust) (Feather River Air Quality Management District 2008).

Air pollutant concentrations are measured at several monitoring stations in the NSVAB. The Yuba City air quality monitoring station on Almond Street is the closest monitoring station to the FRLRP project area with sufficient data to meet EPA and ARB criteria for quality assurance. This monitoring station is approximately 3 miles north-northwest of the proposed project site. In the summer, prevailing winds in the NSVAB are from the south and would generally move emissions from the project area towards the Almond Street monitoring station. In the winter, winds from the north are frequent, but winds from the south predominate (Feather River Air Quality Management District 1998). In general, the ambient air quality measurements from the Almond Street monitoring station are representative of the air quality in the project area. Table 3.11-1, “Summary of Annual Air Quality Data from the Yuba City–Almond Street Air Quality Monitoring Station,” summarizes the air quality data from this monitoring station for the years 2004–2006.

**Table 3.11-1**  
**Summary of Annual Air Quality Data from the Yuba City–Almond Street Monitoring Station**

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 2004        | 2005        | 2006        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|-------------|
| <b>Ozone</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |             |             |             |
| <i>State standard (1-hour/8-hour avg., 0.09/0.07 ppm)</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |             |             |             |
| <i>National standard (8-hour avg., 0.075 ppm)</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |             |             |
| Maximum concentration (1-hour/8-hour avg., ppm)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0.098/0.081 | 0.092/0.073 | 0.102/0.081 |
| Number of days state standard exceeded                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 2           | 0           | 1           |
| Number of days national 8-hour standard exceeded                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0           | 0           | 0           |
| <b>Respirable particulate matter (PM<sub>10</sub>)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |             |             |             |
| <i>State standard (24-hour avg., 50 µg/m<sup>3</sup>)</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |             |             |             |
| <i>National standard (24-hour avg., 150 µg/m<sup>3</sup>)</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |             |             |
| Maximum concentration (µg/m <sup>3</sup> )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 53.0        | 60.0        | 66.0        |
| Number of days state standard exceeded (measured/calculated <sup>a</sup> )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 1/NA        | 5/31.1      | 4/NA        |
| Number of days national standard exceeded (measured/calculated <sup>a</sup> )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0/0         | 0/0         | 0/0         |
| <b>Fine particulate matter (PM<sub>2.5</sub>)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |             |             |
| <i>No separate state standard</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |             |             |
| <i>National standard (24-hour avg., 65 µg/m<sup>3</sup> before late 2006, 35 µg/m<sup>3</sup> after late 2006. 65 µg/m<sup>3</sup> standard applies to data in this table)</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             |             |             |
| Maximum concentration (µg/m <sup>3</sup> , 24 hour concentration measurement)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 39.0        | 45.0        | 42.0        |
| Number of days national standard exceeded (measured <sup>b</sup> )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0           | 0           | 0           |
| <b>Carbon monoxide (CO)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |             |             |             |
| <i>State standard (1-hour/8-hour avg., 20/9 ppm)</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |             |             |             |
| <i>National standard (1-hour/8-hour avg., 35/9 ppm)</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |             |             |             |
| Maximum concentration (1-hour/8-hour avg., ppm)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 5.80/2.54   | 4.40/3.39   | 3.10/2.29   |
| Number of days state standard exceeded                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0           | 0           | 0           |
| Number of days national 1-hour/8-hour standard exceeded                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0/0         | 0/0         | 0/0         |
| <b>Nitrogen dioxide (NO<sub>2</sub>)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |             |             |             |
| <i>State standard (1-hour avg., 0.18 ppm)</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |             |             |
| <i>National standard (annual, 0.053 ppm)</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |             |             |             |
| Maximum concentration (1-hour avg., ppm)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0.066       | 0.062       | 0.070       |
| Annual average (ppm)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 0.012       | 0.012       | 0.012       |
| Number of days state standard exceeded                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0           | 0           | 0           |
| <p>Notes: µg/m<sup>3</sup> = micrograms per cubic meter; NA = not available; ppm = parts per million by volume</p> <p><sup>a</sup> Measured days are those days when an actual measurement was greater than the level of the state daily standard or the national daily standard. Measurements are typically collected every 6 days. Calculated days are the estimated number of days that a measurement would have been greater than the level of the standard had measurements been collected every day. The number of days above the standard is not necessarily the number of violations of the standard for the year.</p> <p><sup>b</sup> The number of days a measurement was greater than the level of the national daily standard. Measurements are collected every day, every 3 days, or every 6 days, depending on the time of year and the site's monitoring schedule. The number of days above the standards is not directly related to the number of violations of the standard for the year.</p> <p>Sources: California Air Resources Board 2008, U.S. Environmental Protection Agency 2008</p> |             |             |             |

Both ARB and EPA use the type of monitoring data provided in Table 3.11-1 to designate areas according to attainment status for criteria air pollutants established by the agencies. The purpose of these designations is to identify those areas with air quality problems and thereby initiate planning efforts for improvement. The three basic designation categories are “nonattainment,” “attainment,” and “unclassified.” The “unclassified” designation is used in an area that cannot be classified on the basis of available information as meeting or not meeting the standards. For example, Yuba County is designated as unclassified for the national ambient air quality standards (NAAQS) PM<sub>10</sub> standard. In addition, the California designations include a subcategory of nonattainment designation, called “nonattainment-transitional.” The nonattainment-transitional designation is given to nonattainment areas that are progressing and nearing attainment.

Yuba County is designated as a nonattainment area with respect to the state standards for ozone (1-hour) and PM<sub>10</sub> (particulate matter less than 10 microns in diameter), and is either in attainment or unclassified for the remaining state standards. Yuba County is either in attainment or unclassified for federal standards (Feather River Air Quality Management District 2008).

### **3.11.2 ENVIRONMENTAL CONSEQUENCES**

#### **3.11.2.1 SIGNIFICANCE CRITERIA AND METHODOLOGY**

The following air quality analysis is very conservative in that it is based on relatively high estimates for emission sources (e.g., type and number of construction equipment, extent of ground disturbance) that would generate air emissions from several overlapping project activities in the same construction year (see Table 2-2, “Segment 2 Construction Schedule,” in Chapter 2). Emission assumptions in some instances erred towards the high end of an available range to ensure that emission estimates were not underrepresented. Almost all increased pollutant emissions that would be directly associated with the Applicant Preferred Alternative – ASB Setback Levee Alternative and other alternatives would be generated by construction activities. Assumptions regarding construction equipment and personnel, haul distances, areas of disturbance, and durations and timing of different construction activities were developed based on the information provided in Section 2.2, “Alternatives Carried Forward in This EIS,” and coordination with project engineers.

The following analysis addresses direct effects of the Applicant Preferred Alternative – ASB Setback Levee Alternative and other alternatives. Potential indirect effects of the Applicant Preferred Alternative and other alternatives are addressed in Chapter 4.0, “Cumulative and Growth-Inducing Effects.” For example, for a discussion of the effects air quality emissions from development potentially facilitated by the Applicant Preferred Alternative and other action alternatives, see Section 4.1.2.9, “Air Quality.” For an evaluation of cumulative air quality effects resulting from the construction and operation of past, present, and future projects see Section 4.2.4.7, “Air Quality.”

Implementation of the Applicant Preferred Alternative, Intermediate Setback Levee Alternative, and the Levee Strengthening Alternative would not result in any major sources of odor and would not involve operation of any of the common types of facilities that are known to produce odors (e.g., landfill, wastewater treatment facility). In addition, the diesel exhaust from the use of on-site construction equipment would be intermittent and temporary, and it would dissipate rapidly from the source with an increase in distance. Thus, implementation of the Applicant Preferred Alternative or other alternatives would not expose sensitive receptors to odorous emissions, and this issue is not discussed further.

#### **Federal General Conformity Thresholds**

The primary criteria for evaluating air emissions impacts is whether annual emissions of pollutants for which the district is in nonattainment with the federal standards exceed EPA’s general conformity thresholds. General conformity applies in both federal nonattainment and maintenance areas. Within these areas, it applies to any federal action not specifically exempted by the Clean Air Act or EPA regulations. Emissions from construction

activities are also included. If a federal action falls under the general conformity rule, the federal agency responsible for the action is responsible for making the conformity determination. The analyses to determine conformity must quantify short- and long-term emissions of air pollutants from implementation of the action in question, and describe whether the action would cause or contribute to any new violation of any standard, interfere with maintenance of any standard, increase the frequency or severity of any existing violation of any standard, or delay timely attainment of any standard.

General conformity requirements would apply to actions where the total project-generated direct or indirect emissions would be equal to or exceed the applicable emissions levels, known as the de minimis thresholds, or would be greater than 10 percent of the area's annual emissions budget, known as regionally significant thresholds. If either of the thresholds is exceeded, a formal conformity determination would be needed prior to project approval. The primary criteria for evaluating air emissions impacts is whether annual emissions of pollutants for which the district is in nonattainment with the federal standards exceed EPA's general conformity thresholds. The thresholds for the Yuba County area are as follows:

#### De Minimis Thresholds:

- ▶ 50 tons per year of NO<sub>x</sub>,
- ▶ 50 tons per year of ROG, and
- ▶ 100 tons per year of PM<sub>10</sub>

#### Regionally Significant Thresholds:

- ▶ 280 tons per year of NO<sub>x</sub>,
- ▶ 310 tons per year of ROG, and
- ▶ 289 tons per year of PM<sub>10</sub>.

### Local Air Quality Thresholds

As stated above, the FRAQMD portion of the NSVAB is designated as a nonattainment area with respect to the state standards for ozone (1-hour) and PM<sub>10</sub>. Yuba and Sutter Counties are designated as a nonattainment area with respect to the state standards for ozone (1-hour) and PM<sub>10</sub>, and are either in attainment or unclassified for the remaining state standards.

Significance thresholds for total maximum daily emissions are used by local air quality management districts as a guide to identify the level of significance that a project may have on the formation of ozone and a project's contribution to the district's overall PM<sub>10</sub> load. The FRAQMD *Indirect Source Review Guidelines* and CEQA planning guidance (Feather River Air Quality Management District 1998, 2008) provide recommended thresholds of significance for project-generated emissions of ozone precursors and PM<sub>10</sub> for purposes of CEQA compliance. According to these guidelines, a significant construction emissions impact under CEQA would occur if:

- ▶ project implementation would substantially conflict with or substantially obstruct implementation of the applicable air quality plan, or
- ▶ project construction would result in emissions that exceed:
  - 25 pounds per day (lb/day) of ROG,
  - 25 lb/day of NO<sub>x</sub>, or
  - 80 lb/day of PM<sub>10</sub>.

Although the FRAQMD specifically provides these thresholds for use in CEQA analyses, they are also used as significance criteria in this EIS.

## Toxic Air Contaminants

The California Air Resources Board (ARB) identified particulate exhaust emissions from diesel-fueled engines as a toxic air contaminant (TAC) in 1998. The dose to which receptors are exposed is the primary factor used to determine the health risk, and a longer exposure period would result in a higher exposure level for the maximally exposed individual. Thus, the risks estimated for a maximally exposed individual are higher if a fixed exposure occurs over a longer period of time. According to the California Environmental Protection Agency's Office of Environmental Health Hazard Assessment (OEHHA), health risk assessments, which determine the exposure of sensitive receptors to TAC emissions, should be based on a 70-year exposure period; however, such assessments should be limited to the period/duration of activities associated with the project (Salinas, pers. comm., 2004). Therefore, due to the temporary nature of the emissions generated by construction activities, neither the Applicant Preferred Alternative – ASB Setback Levee Alternative nor the other alternatives could potentially exceed the state TAC threshold identified by OEHHA, and would not result in a significant adverse effect if these standards were used.

### 3.11.2.2 APPLICANT PREFERRED ALTERNATIVE – ASB SETBACK LEVEE ALTERNATIVE

#### AP Impact 3.11-a: Air Quality Effects of Project Construction Emissions

Fugitive dust and mobile-source emissions (such as motor vehicle exhaust) would be generated by various construction activities, including equipment operation at the construction sites, construction personnel commute trips, the delivery of equipment and materials to the construction areas, and ground disturbance during construction and excavation. Mobile-source emissions contain criteria pollutants, including ozone precursors (ROG and NO<sub>x</sub>) and fine particulate matter (PM<sub>10</sub>); however, fugitive dust associated with the disturbance and handling of soil would be considered the primary source of PM<sub>10</sub>. It was assumed for purposes of emissions calculations that the following mobile heavy-construction equipment could be used for project construction: scrapers, excavators, haul trucks, water trucks, bulldozers, loaders, generators, pumps, rollers, graders, and other miscellaneous construction equipment. The emissions calculations and modeling results are provided in Appendix I.

The amount and types of equipment used during construction activities would vary from day to day depending on the specific activities being conducted. The number of off-site vehicle trips is also anticipated to vary from day to day. For purposes of calculating the maximum potential daily emissions, it was assumed that the equipment listed above would operate simultaneously for 8 hours on a day of maximum construction activity. This is a conservative assumption used to calculate potential maximum daily emissions.

A construction labor force of up to 70 workers and an average travel distance of 10 miles to/from the construction site were assumed.

The daily average area of ground disturbance was estimated by calculating an estimated project footprint, including additional acreage to account for staging areas, borrow sources, and other activities, and dividing the total by the expected number of work days. The total length of the existing levee in Segment 2 is approximately 6.2 miles. In addition, the Applicant Preferred Alternative – ASB Setback Levee Alternative setback levee would be approximately 5.7 miles long. The area of ground disturbance would be approximately 360 acres over approximately 26 months (schedule based in part on anticipated timeline for completion of Corps permitting process and applicants initiation of work in areas not requiring federal authorization prior to permitting being completed). The average area actively disturbed each day was assumed to be approximately 2–3 acres.

The emissions calculations also included expected truck trips to haul borrow material, export degraded levee material, and delivery of materials to and within the site. These materials were assumed to be transported an average of 4 miles round trip on some paved roads and some unpaved roads. In some cases trucks would travel farther than 4 miles round trip from the levee to the borrow site, and in other cases, trucks would travel less than



4 miles round trip. Thus, an average distance was assumed. This is a conservative assumption to provide a margin of error and to ensure that emissions are not underrepresented.

Average daily construction emissions were modeled using the Road Construction Emissions Model Version 5.2 developed by the Sacramento Metropolitan Air Quality Management District (SMAQMD) and, recommended by FRAQMD for levee construction projects to obtain mobile-source emissions. In addition, separate manual calculations were conducted using the EPA's AP-42 emission factors for fugitive PM<sub>10</sub> emissions associated with earth moving, ground disturbance, and material handling. As stated above, detailed modeling results are provided in Appendix I. Consistent with guidance for calculating emissions to determine exceedance of the general conformity thresholds, emissions were calculated assuming the implementation of the FRAQMD's standard mitigation measures (listed in Section 3.11.3 below). Implementing these measures is expected to achieve a 75% reduction in fugitive dust emissions, 5% reduction in ROG emissions from construction equipment, 20% reduction in NO<sub>x</sub> emissions from construction equipment, and 45% reduction in PM<sub>10</sub> emissions from construction equipment (Sacramento Metropolitan Air Quality Management District 2004). The resulting maximum average annual mitigated emissions, shown in Table 3.11-2, are calculated to be 12 tons/year of ROG, 49 tons/year of NO<sub>x</sub>, and 80 tons/year of PM<sub>10</sub> during project construction. Mitigated emissions of ROG, NO<sub>x</sub>, and PM<sub>10</sub> fall below the applicable federal thresholds listed above (50, 50, and 100 tons/year, respectively).

| <b>Table 3.11-2<br/>Summary of Maximum Annual Average Construction Emissions (Federal Threshold)<br/>with Mitigation Incorporated</b>                                                                                                                                                                                                                                                    |                       |                 |                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-----------------|------------------|
| Total Emissions                                                                                                                                                                                                                                                                                                                                                                          | Pollutant (tons/year) |                 |                  |
|                                                                                                                                                                                                                                                                                                                                                                                          | ROG                   | NO <sub>x</sub> | PM <sub>10</sub> |
| 2008 Construction Activity                                                                                                                                                                                                                                                                                                                                                               |                       |                 |                  |
| Total Unmitigated                                                                                                                                                                                                                                                                                                                                                                        | 8                     | 42              | 319              |
| Total Mitigated <sup>1</sup>                                                                                                                                                                                                                                                                                                                                                             | 7                     | 33              | 80               |
| 2009 Construction Activity                                                                                                                                                                                                                                                                                                                                                               |                       |                 |                  |
| Total Unmitigated                                                                                                                                                                                                                                                                                                                                                                        | 12                    | 61              | 267              |
| Total Mitigated <sup>1</sup>                                                                                                                                                                                                                                                                                                                                                             | 12                    | 49              | 67               |
| 2010 Construction Activity <sup>2</sup>                                                                                                                                                                                                                                                                                                                                                  |                       |                 |                  |
| Total Unmitigated                                                                                                                                                                                                                                                                                                                                                                        | 7                     | 30              | 265              |
| Total Mitigated <sup>1</sup>                                                                                                                                                                                                                                                                                                                                                             | 6                     | 24              | 66               |
| Federal De Minimis Threshold                                                                                                                                                                                                                                                                                                                                                             | 50                    | 50              | 100              |
| Federal Regionally Significant Threshold                                                                                                                                                                                                                                                                                                                                                 | 310                   | 280             | 289              |
| <sup>1</sup> Based on a 5% reduction in ROG emissions from construction equipment, 20% reduction in NO <sub>x</sub> emissions from construction equipment, 45% reduction in PM <sub>10</sub> emissions from construction equipment, and 75% reduction in fugitive dust emissions (Sacramento Metropolitan Air Quality Management District 2004).                                         |                       |                 |                  |
| <sup>2</sup> Because the extent of the construction activity associated with levee degrading that would occur in 2009 and 2010 respectively was not known, emissions estimated for each calendar year may be double-counted. Modeling that was conducted for the 2010 construction season is considered a worst-case scenario, and actual emissions would likely be lower than reported. |                       |                 |                  |
| Source: Data modeled by EDAW in 2008 and contained in Appendix I of this EIS                                                                                                                                                                                                                                                                                                             |                       |                 |                  |

Total unmitigated worst-case daily emissions (i.e., maximum daily emissions applicable to local thresholds) for the 2008, 2009, and 2010 construction seasons are summarized in Table 3.11-3 below, and were calculated to be 102 pounds/day (lb/day) of ROG, 528 lb/day of NO<sub>x</sub>, and 4,019 lb/day of PM<sub>10</sub>. See Appendix I for detailed emission sources and assumptions. Table 3.11-3 also shows the calculated emissions with implementation of FRAQMD's standard mitigation measures (described in Section 3.11.3).

| <b>Table 3.11-3<br/>Summary of Maximum Daily Average Construction Emissions (FRAQMD Threshold)<br/>with Mitigation Incorporated</b>                                                                                                                                                                                                                                                      |                    |                 |                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----------------|------------------|
| Total Emissions                                                                                                                                                                                                                                                                                                                                                                          | Pollutant (lb/day) |                 |                  |
|                                                                                                                                                                                                                                                                                                                                                                                          | ROG                | NO <sub>x</sub> | PM <sub>10</sub> |
| 2008 Construction Activity                                                                                                                                                                                                                                                                                                                                                               |                    |                 |                  |
| Total Unmitigated                                                                                                                                                                                                                                                                                                                                                                        | 102                | 528             | 3,627            |
| Total Mitigated <sup>1</sup>                                                                                                                                                                                                                                                                                                                                                             | 97                 | 422             | 907              |
| 2009 Construction Activity                                                                                                                                                                                                                                                                                                                                                               |                    |                 |                  |
| Total Unmitigated                                                                                                                                                                                                                                                                                                                                                                        | 102                | 491             | 4,019            |
| Total Mitigated <sup>1</sup>                                                                                                                                                                                                                                                                                                                                                             | 97                 | 393             | 1,005            |
| 2010 Construction Activity <sup>2</sup>                                                                                                                                                                                                                                                                                                                                                  |                    |                 |                  |
| Total Unmitigated                                                                                                                                                                                                                                                                                                                                                                        | 102                | 438             | 4,017            |
| Total Mitigated <sup>1</sup>                                                                                                                                                                                                                                                                                                                                                             | 97                 | 351             | 1,004            |
| FRAQMD Threshold                                                                                                                                                                                                                                                                                                                                                                         | 25                 | 25              | 80               |
| <sup>1</sup> Based on a 5% reduction in ROG emissions from construction equipment, 20% reduction in NO <sub>x</sub> emissions from construction equipment, 45% reduction in PM <sub>10</sub> emissions from construction equipment, and 75% reduction in fugitive dust emissions (Sacramento Metropolitan Air Quality Management District 2004).                                         |                    |                 |                  |
| <sup>2</sup> Because the extent of the construction activity associated with levee degrading that would occur in 2009 and 2010 respectively was not known, emissions estimated for each calendar year may be double-counted. Modeling that was conducted for the 2010 construction season is considered a worst-case scenario, and actual emissions would likely be lower than reported. |                    |                 |                  |
| Source: Data modeled by EDAW in 2008 and contained in Appendix I of this EIS                                                                                                                                                                                                                                                                                                             |                    |                 |                  |

Mitigated daily construction emissions of ROG, NO<sub>x</sub>, and PM<sub>10</sub> would still exceed the FRAQMD-recommended maximum daily emissions thresholds of 25 lb/day of ROG and NO<sub>x</sub> and 80 lb/day of PM<sub>10</sub>. Because of the large size of the project and high activity level with construction activities to be conducted concurrently at multiple locations, as well as the nonattainment status of the project area, and based on the modeling conducted, it is foreseeable that both unmitigated and mitigated construction-generated emissions could result in or substantially contribute to a violation of air quality standards. However, given the temporary nature of construction activities, it is not anticipated that construction emissions would substantially conflict with air quality planning efforts.

### 3.11.2.3 INTERMEDIATE SETBACK LEVEE ALTERNATIVE

#### ISL Impact 3.11-a: Air Quality Effects of Project Construction Emissions

The construction program under the Intermediate Setback Levee Alternative would generally be the same as described above for the Applicant Preferred Alternative – ASB Setback Levee Alternative. Although locations of some project elements would differ, methods of constructing the slurry cutoff wall, foundation preparation, levee embankment construction, utility relocation, removal of the existing levee, relocation of Pump Station No. 3, and other construction elements would be the same. The Intermediate Setback Levee Alternative would follow the same construction schedule as the Applicant Preferred Alternative. Like the Applicant Preferred Alternative, it is estimated that under the Intermediate Setback Levee Alternative, approximately 3.6 million cu. yd. of material would be required for setback levee construction. Although the length of the Intermediate Setback Levee is approximately 0.2 miles less than the Applicant Preferred Alternative, the existing ground surface is at a lower elevation along much of the Intermediate Setback Levee alignment. Therefore, more soil is needed to build a levee to the desired height, resulting in the same borrow material needs for both alternatives. Potential borrow areas would be the same as described previously for the Applicant Preferred Alternative and would be treated in the same manner. The process for removal of the existing levee would be the same for both alternatives.

Operation and maintenance of the setback levee and the levee setback area would also be the same as described for the Applicant Preferred Alternative.

Because the construction program, schedule, and intensity under the Intermediate Setback Levee Alternative would be very similar to the Applicant Preferred Alternative, the adverse effects to air quality would, likewise, be very similar. Mitigated emissions of ROG, NO<sub>x</sub>, and PM<sub>10</sub> would fall below the applicable federal de minimis thresholds listed above (50, 50, and 100 tons/year, respectively) but would exceed the FRAQMD's thresholds for daily emissions.

#### **3.11.2.4 LEVEE STRENGTHENING ALTERNATIVE**

##### **LS Impact 3.11-a: Air Quality Effects of Project Construction Emissions**

The Levee Strengthening Alternative would involve repairs and improvements to the existing Feather River levee along Segment 2. No setback levee would be constructed. Repairs and improvements would consist of construction of slurry walls, installation of relief wells, raising and/or constructing seepage/stability berms at various locations, and correcting identified waterside erosion problem areas. Under this alternative, the existing Pump Station No. 3 would be removed and a new pump station would be installed farther east of the existing site. Soil borrow areas would be established of sufficient size to support levee repairs. A construction period of about 8 months, beginning in the first spring after detailed designs are completed, is assumed for levee repair and strengthening in project Segment 2 if this alternative is selected. The equipment list of the Levee Strengthening Alternative is fairly similar to the equipment list for the Applicant Preferred Alternative – ASB Setback Levee Alternative.

Requirements for borrow material would be substantially less under the Levee Strengthening Alternative than alternatives incorporating a setback levee because the existing levee would be retained and soil for a setback levee would not be necessary. In addition, material excavated from the slurry cutoff wall trenches would be used to the extent practicable, reducing the need for borrow material from off-site sources. However, it is still estimated that a total of approximately 1.4 million cu. yd. of borrow material would be required for levee repair and strengthening activities.

Although the Levee Strengthening Alternative would disturb a substantial amount of soil and would require approximately 1.4 million cu. yd. of borrow material, because this alternative would utilize much of the levee's existing materials, and because the alternative would not include other major soil-moving activities included in the Applicant Preferred Alternative, such as removing the existing levee, the amount of soil disturbance would be considerably less under the Levee Strengthening Alternative. Consequently, emissions from construction equipment and fugitive dust emissions would be lower, and like the Applicant Preferred Alternative, would not exceed federal de minimis emission thresholds described above. However, also like the Applicant Preferred Alternative, emissions associated with the Levee Strengthening Alternative would exceed the FRAQMD's thresholds for daily emissions. This is true in large part because the FRAQMD's daily emission thresholds are exceptionally low. As few as five or six pieces of construction equipment operating simultaneously could result in an exceedance of the FRAQMD threshold for NO<sub>x</sub>, even with implementation of emission reduction mitigation.

#### **3.11.2.5 NO-ACTION ALTERNATIVE**

If no permissions were granted to alter the existing levee or discharge dredged or fill material into waters of the United States, construction work necessary to completely repair the Segment 2 levee would not be allowed, and ground-disturbing activities would be limited to normal levee maintenance activities. Under these conditions, heavy underseepage and loss of foundation soils would be expected to continue and the threat of another levee failure would remain. Under the No-Action Alternative, it is possible that localized levee repairs (e.g., correction of identified waterside erosion sites) could be authorized under the federal Clean Water Act (CWA) Nationwide

Permit (NWP) #3. It is unlikely that earthwork associated with localized repair activities would result in emissions exceeding applicable thresholds.

If no action was taken to completely repair this deficient levee segment, the existing flood risk and the potential for another levee failure to inundate the RD 784 area would remain unchanged. A levee failure in Segment 2 could result in catastrophic damages, as previously discussed. Cleanup activities following such a failure and the resulting flooding in the RD 784 area would include substantial levee repairs, soil regrading, and debris cleanup using heavy equipment and would likely include demolition of damaged structures as well. These activities may result in elevated levels of pollutant emissions from equipment exhaust and earthmoving that could be substantial.

### 3.11.3 MITIGATION

The following mitigation measure would be applied to **the Applicant Preferred Alternative – ASB Setback Levee Alternative, Intermediate Setback Levee Alternative, and Levee Strengthening Alternative.**

#### **Mitigation Measure 3.11-a: Implement FRAQMD Measures for Reducing Short-Term Air Quality Impacts; Comply with FRAQMD Rules and Regulations**

FRAQMD's Indirect Source Review Guidelines provide mitigation measures for reducing short-term air quality impacts. As recommended by FRAQMD, Three Rivers Levee Improvement Authority (TRLIA) shall ensure that the following mitigation measures (summarized from FRAQMD guidance) are implemented during all project construction activities to the extent practicable. In addition, construction is required to comply with all applicable FRAQMD rules and regulations, in particular Rule 3.0 (Visible Emissions), Rule 3.16 (Fugitive Dust Emissions), and Rule 3.15 (Architectural Coatings). However, as identified in the impact discussions above, even with implementation of these measures, construction emissions would exceed FRAQMD daily emission thresholds.

1. Implement a Fugitive Dust Control Plan that includes the following measures:

- ▶ Operations, including all earthmoving, ground disturbing, soil dumping, and grading, on a project should be suspended when winds carry dust beyond the property line despite implementation of all feasible dust control measures. Consideration should be given to suspending all project grading when winds exceed 20 mph to minimize the risk of dust being carried beyond the property line.
- ▶ Construction sites shall be watered as directed by the [Yuba County] Department of Public Works or FRAQMD and as necessary to prevent fugitive dust violations.
- ▶ An operational water truck should be on-site at all times. Apply water to control dust as needed to prevent visible emissions violations and offsite dust impacts.
- ▶ On-site dirt piles or other stockpiled particulate matter should be covered, wind breaks installed, and water and/or soil stabilizers employed to reduce windblown dust emissions. Incorporate the use of approved nontoxic soil stabilizers according to manufacturer's specifications to all inactive construction areas.
- ▶ All transfer processes involving a free fall of soil or other particulate matter shall be operated in such a manner as to minimize the free fall distance and fugitive dust emissions.
- ▶ Apply chemical soil stabilizers according to the manufacturers' specifications, to all inactive construction areas (previously graded areas that remain inactive for 96 hours) including unpaved roads and employee/equipment parking areas. Where an applicable surface water quality oversight agency, such as the RWQCB, has approval authority over the application of chemical soil stabilizers, application of the stabilizers shall not be initiated until necessary approvals are received.

- ▶ To prevent track-out, wheel washers should be installed where project vehicles and/or equipment exit onto paved streets from unpaved roads. Vehicles and/or equipment shall be washed prior to each trip. Alternatively, a gravel bed may be installed as appropriate at vehicle/equipment site exit points to effectively remove soil buildup on tires and tracks to prevent/diminish track-out.
  - ▶ Paved streets shall be swept frequently (water sweeper with reclaimed water recommended; wet broom) if soil material has been carried onto adjacent paved, public thoroughfares from the project site.
  - ▶ Provide temporary traffic control as needed during all phases of construction to improve traffic flow, as deemed appropriate by the Yuba County Department of Public Works and/or Caltrans [California Department of Transportation] and to reduce vehicle dust emissions.
  - ▶ Reduce traffic speeds on all unpaved surfaces to 15 mph or less and reduce unnecessary vehicle traffic by restricting access. Provide appropriate training, on-site enforcement, and signage.
  - ▶ Reestablish ground cover on the construction site as soon as possible and prior to final occupancy, through seeding and watering.
  - ▶ No open burning of vegetative waste (natural plant growth wastes) or other materials (trash, demolition debris et al.) may be conducted at the project site. Materials also may not be hauled off-site for disposal by open burning. Vegetative wastes should be chipped or delivered to waste to energy facilities (permitted biomass facilities), mulched, composted, or used for firewood.
  - ▶ Cover all trucks hauling dirt, sand, soil, gravel, or other loose material, or maintain at least 2 feet of freeboard (minimum vertical distance between the top of the load and the top of the trailer) in accordance with the requirements of California Vehicle Code Section 23114. This provision would be enforced by local law enforcement agencies.
2. Construction equipment exhaust emissions shall not exceed FRAQMD Regulation III, Rule 3.0 (“Visible Emissions”) limitations (40% opacity or Ringelmann 2.0). Operators of vehicles and equipment found to exceed opacity limits shall take action to repair the equipment within 72 hours or remove the equipment from service. Failure to comply may result in a Notice of Violation.
  3. The primary contractor shall be responsible to ensure that all construction equipment is properly tuned and maintained prior to and for the duration of onsite operation.
  4. Limit vehicle and equipment idling times to 5 minutes—saves fuel and reduces emissions.
  5. Use existing power sources (e.g., power poles) or clean fuel generators rather than temporary power generators.
  6. Develop and implement a traffic plan to minimize traffic flow interference from construction activities. The plan may include advance public notice of routing, use of public transportation, and satellite parking areas with a shuttle service. Schedule operations affecting traffic for off-peak hours. Minimize obstruction of through-traffic lanes. Provide a flag person to guide traffic properly and ensure safety at construction sites.
  7. Portable engines and portable engine-driven equipment units used at the project work site, with the exception of on-road and off-road motor vehicles, may require ARB Portable Equipment Registration with the state or a local district permit. The owner/operator shall be responsible for arranging appropriate consultations with ARB or the FRAQMD to determine registration and permitting requirements prior to equipment operation at the site.
  8. The proponent shall assemble a comprehensive inventory list (i.e., make, model, engine year, horsepower, and emission rates) of all heavy-duty off-road (portable and mobile) equipment (50 horsepower and greater) that

will be used an aggregate of 40 or more hours for the construction project and apply the following mitigation measure:

The project shall provide a plan for approval by FRAQMD demonstrating that the heavy-duty (equal to or greater than 50 horsepower) off-road equipment to be used in the construction project, including owned, leased and subcontractor vehicles, would achieve a project-wide fleet-average 20% NO<sub>x</sub> reduction and 45% particulate reduction compared to the most recent ARB fleet average at time of construction.

In addition, the following measures, above and beyond the requirements of the FRAQMD mitigation measures, shall be implemented.

1. Construction inspectors shall be instructed to report to TRLIA's engineer instances of vehicles and equipment idling for greater than 5-minutes, vehicles and equipment that are clearly not properly tuned or not operating properly, and obvious instances where vehicles and equipment have been inappropriately modified or tampered with. TRLIA's engineer shall follow-up on these reports with the construction contractor and require the construction contractor to take corrective action where necessary.
2. TRLIA shall convey to the construction contractor the desire for construction vehicles and equipment to meet the most stringent of applicable Federal and State standards. Preference is for Tier 2 or newer engines in the construction fleet. TRLIA shall also convey to the construction contractor a desire for construction equipment to be fitted with EPA-registered particulate traps and other appropriate controls where suitable to reduce emissions of diesel particulate matter.



## **3.12 NOISE AND VIBRATION**

The following analysis addresses direct effects of the Applicant Preferred Alternative – Above Star Bend (ASB) Setback Levee Alternative (also referred to as the “Applicant Preferred Alternative”) and other alternatives. Potential indirect effects of the Applicant Preferred Alternative and other alternatives are addressed in Chapter 4.0, “Cumulative and Growth-Inducing Effects.” For example, for an evaluation of the effects related to the exposure of existing noise-sensitive land uses to development potentially facilitated by the Applicant Preferred Alternative and other action alternatives, see Section 4.1.2.10, “Noise.” For an evaluation of the combined effects on noise-sensitive land uses from implementation of past, present, and future projects in the region, see Section 4.2.4.8, “Noise and Vibration.”

### **3.12.1 EXISTING CONDITIONS**

#### **3.12.1.1 EXISTING NOISE-SENSITIVE RECEPTORS**

Noise-sensitive land uses generally include those uses where exposure would result in adverse effects (e.g., sleep disturbance, annoyance), as well as uses where quiet is an essential element of their intended purpose. Residences are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels. Other land uses typically considered sensitive to noise include hospitals, convalescent facilities, parks, auditoriums, amphitheaters, public meeting rooms, motels, hotels, churches, schools, libraries, and other uses where low interior noise levels are essential.

The noise-sensitive receptors in the FRLRP project vicinity include a nursing home located just east of the proposed setback levee alignment on Ella Avenue, five single-family residences in the levee setback area, and various homes along roads that may be used as haul routes to move material to and from soil borrow areas east of the setback levee alignment. The locations of sensitive noise receptors in the vicinity of project construction activities are shown in Figure 3.12-1.

#### **3.12.1.2 EXISTING NOISE ENVIRONMENT**

Vehicle traffic is the primary noise source in the project vicinity. The major roadways in the area are SR 70 and Feather River Boulevard (see Figure 3.13-1, “Roads in the Vicinity of the Project Area,” in Section 3.13, “Transportation and Circulation”). Feather River Boulevard is located near, or relatively near, the existing levee through Segment 2. Traffic on Feather River Boulevard and SR 70 includes agricultural equipment; truck traffic from food processing plants, industrial sites, and logging; recreational vehicles; and vehicle traffic associated with the Plumas Lake area, Olivehurst, Linda, Marysville, and Yuba City, including commuters traveling to places of employment in the Sacramento region. Additional sources of noise in this area include agricultural operations, boats, pets, and occasional passing trains and aircraft.

Existing roadway traffic noise levels were calculated for SR 70 and Feather River Boulevard in the vicinity of project Segment 2 using the FHWA Traffic Noise Prediction Model (Federal Highway Administration 1988) with traffic data for segments of SR 70 and Feather River Boulevard in the project area (California Department of Transportation 2006, Yuba County 1994). The inputs and calculations are shown in Table 3.12-1, “Modeled Existing Vehicular Traffic-Noise Levels on SR 70 and Feather River Boulevard.”

#### **3.12.1.3 VIBRATION STANDARDS**

To address the human response to groundborne vibration, the Federal Transit Administration (FTA) has set forth the following maximum acceptable vibration criteria for different types of land uses (Federal Transit Administration 1995):

**Table 3.12-1  
Modeled Existing Vehicular Traffic-Noise Levels on State Route 70 and Feather River Boulevard <sup>1</sup>**

| Roadway Segment                                                                                                                                                                                                                              | Distance (Feet) from Roadway Centerline to CNEL/L <sub>dn</sub> (dBA) |         |         |         | CNEL/L <sub>dn</sub> (dBA) 50 Feet from Centerline of Near Travel Lane |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|---------|---------|---------|------------------------------------------------------------------------|
|                                                                                                                                                                                                                                              | 70 CNEL                                                               | 65 CNEL | 60 CNEL | 55 CNEL |                                                                        |
| State Route 70                                                                                                                                                                                                                               |                                                                       |         |         |         |                                                                        |
| Between Feather River Boulevard and North Beale Road                                                                                                                                                                                         | 244.4                                                                 | 524.4   | 1,128.7 | 2,430.7 | 78.11                                                                  |
| Feather River Boulevard                                                                                                                                                                                                                      |                                                                       |         |         |         |                                                                        |
| North of Broadway                                                                                                                                                                                                                            | NA                                                                    | NA      | 105     | 225     | 64                                                                     |
| South of Grand Avenue                                                                                                                                                                                                                        | NA                                                                    | 101     | 217     | 468     | 69                                                                     |
| Notes                                                                                                                                                                                                                                        |                                                                       |         |         |         |                                                                        |
| CNEL = community noise equivalent level; dBA = A-weighted decibels; L <sub>dn</sub> = day-night noise level; NA = not available;                                                                                                             |                                                                       |         |         |         |                                                                        |
| SR = State Route                                                                                                                                                                                                                             |                                                                       |         |         |         |                                                                        |
| <sup>1</sup> Modeled noise levels do not consider any shielding or reflection of noise by existing structures or terrain features or noise contribution from other sources and where:                                                        |                                                                       |         |         |         |                                                                        |
| dBA is a measure on a logarithmic scale that indicates the squared ratio of sound pressure to a reference sound pressure. A-weighted (A) refers to the specific frequency-dependent rating scale that is used to approximate human response. |                                                                       |         |         |         |                                                                        |
| CNEL is the energy average of the A-weighted noise levels during a 24-hour period with 5 dBA added to the evening (7–10 p.m.) hours and 10 dBA to the night (10 p.m.–7 a.m.) hours.                                                          |                                                                       |         |         |         |                                                                        |
| L <sub>dn</sub> is the energy average of the A-weighted noise levels during a 24-hour period with 10 dBA added to the night (10 p.m.–7 a.m.) hours.                                                                                          |                                                                       |         |         |         |                                                                        |
| Sources: Yuba County 1994, Yuba County Water Agency 2003a, California Department of Transportation 2006, data provided by EDAW in 2006                                                                                                       |                                                                       |         |         |         |                                                                        |

- ▶ 65 vibration decibels (VdB) for land uses where low ambient vibration is essential for interior operations (such as hospitals and high-tech manufacturing or laboratory facilities),
- ▶ 80 VdB for residential uses and buildings where people normally sleep, and
- ▶ 83 VdB for institutional land uses with primarily daytime operations (such as schools, churches, clinics, and offices).

Standards have also been established to address the potential for groundborne vibration to cause structural damage to buildings. These standards were developed by the Committee of Hearing, Bio Acoustics, and Bio Mechanics (CHABA) at the request of the EPA (Federal Transit Administration 1995). For fragile structures, CHABA recommends a maximum of 0.25 inch per second (in/sec) peak particle velocity (PPV) (Federal Transit Administration 1995).

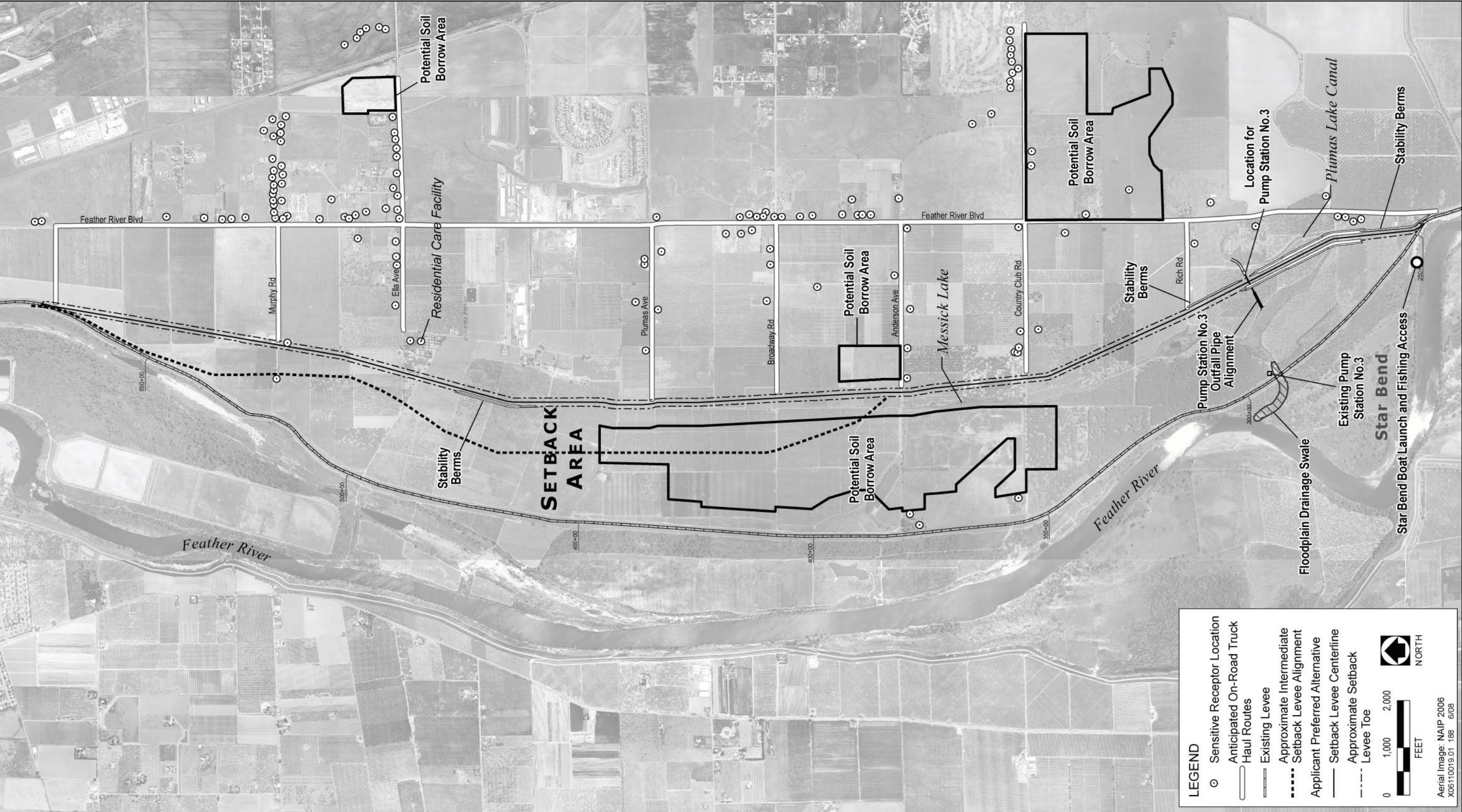
## 3.12.2 ENVIRONMENTAL CONSEQUENCES

### 3.12.2.1 SIGNIFICANCE CRITERIA

A project alternative would have a significant impact related to noise and vibration if it would:

- ▶ Cause a substantial increase in noise levels above ambient levels for sensitive receptors,
- ▶ Exceed a local noise regulation, or





Source: Data compiled by EDAW in 2008

Locations of Sensitive Noise Receptors

Figure 3.12-1



- ▶ Result in construction-generated vibration levels exceeding 80 VdB (FTA’s maximum acceptable vibration standard with respect to human response at residential uses) (Federal Transit Administration 1995) or 0.25 in/sec PPV (CHABA’s recommended standard with respect to the prevention of structural building damage for fragile structures) at nearby existing noise-sensitive land uses.

As discussed above, the analysis in this section addresses direct effects of the Applicant Preferred Alternative – ASB Setback Levee Alternative and other alternatives. Potential indirect effects of the Applicant Preferred Alternative and other alternatives are addressed in Chapter 4.0, “Cumulative and Growth-Inducing Effects.” For example, for an evaluation of the effects related to the exposure of existing noise-sensitive land uses to development potentially facilitated by the Applicant Preferred Alternative and other action alternatives, see Section 4.1.2.10, “Noise.” For an evaluation of the combined effects on noise-sensitive land uses from implementation of past, present, and future projects in the region, see Section 4.2.4.8, “Noise and Vibration.”

### **3.12.2.2 APPLICANT PREFERRED ALTERNATIVE – ASB SETBACK LEVEE ALTERNATIVE**

#### **AP Impact 3.12-a: Substantial Increase in Noise Levels Above Ambient Levels for Sensitive Receptors**

Almost all noise that would be associated with the Applicant Preferred Alternative – Above Star Bend (ASB) Setback Levee Alternative (also referred to as the “Applicant Preferred Alternative”) would be generated by construction activities and, therefore, would be short term. The estimates of construction-related noise levels are based on anticipated equipment use and noise-generation factors developed by the EPA (1971) and the Federal Transit Administration (1995).

The only operational activities that would be associated with the Applicant Preferred Alternative would be the performance of maintenance activities at the setback levee similar to those currently being performed at the existing Feather River levee. These activities would be undertaken only periodically and would not increase ambient noise levels noticeably. Further, no new stationary sources of noise would be introduced to the project area. Although an existing source of operational noise would be relocated, that is, Pump Station No. 3, it would not be moved near any sensitive receptors. In addition, noise generating equipment associated with the pump station (e.g., pumps), would be encased within a concrete structure, which would substantially decrease noise leaving the facility. No long-term sources of noise would be associated with levee repairs and strengthening, and no new stationary sources of noise would be introduced to the project area. For these reasons, only construction-generated noise is addressed in this section.

On-site equipment required for construction of the Applicant Preferred Alternative is anticipated to include hydraulic excavators, scrapers, bulldozers, graders, rollers, water wagons, highway dump trucks, a lubricating truck, a loader, a truck-mounted crane, and numerous pickup trucks. Depending on the operations conducted, individual equipment noise levels can range from 77 to 98 dBA at 50 feet, as indicated in Table 3.12-2.

The simultaneous operation of the on-site construction equipment associated with the Applicant Preferred Alternative, as identified above, could result in combined intermittent noise levels of approximately 104 dBA 50 feet from the proposed alignment. This estimate is calculated based on the very conservative assumption that multiple pieces of equipment that generate the highest noise levels would be operating at the same site along the project alignment at the same time. However, this scenario is very unlikely to occur, particularly with the linear nature of the construction area. Also, the construction effort would consist of several activities: construction of the setback levee, the construction of the new pump station, relocation of utilities, excavation and transport of materials from borrow sites, construction of the drainage swale, and removal of the existing levee. These activities would take place at different locations, and in some cases, during different construction seasons. Nevertheless, it is assumed for this analysis that noise from these sources may have cumulative effects on nearby sensitive receptors, and that noise levels 50 feet from any part of the construction area where heavy equipment is operating

**Table 3.12-2  
Typical Equipment Noise Levels**

| Type of Equipment | Noise Level in dBA at 50 Feet  |                               |
|-------------------|--------------------------------|-------------------------------|
|                   | Without Feasible Noise Control | With Feasible Noise Control * |
| Dozer or tractor  | 80                             | 75                            |
| Scraper           | 88                             | 80                            |
| Excavator         | 88                             | 80                            |
| Compactor         | 82                             | 75                            |
| Roller            | 74                             | –                             |
| Backhoe or loader | 85                             | 75                            |
| Grader            | 85                             | 75                            |
| Crane             | 83                             | 75                            |
| Generator         | 78                             | 75                            |
| Drill             | 98                             | 80                            |
| Compressor        | 81                             | 75                            |
| Pump              | 76                             | 75                            |
| Truck             | 91                             | 75                            |
| Chain saw         | 77                             | 77                            |

Note: dBA = A-weighted decibels

\* Feasible noise control includes the use of intake mufflers, exhaust mufflers, and engine shrouds in accordance with manufacturers' specifications.

Sources: U.S. Environmental Protection Agency 1971, Federal Transit Administration 1995

could be in the range of 74–104 dBA. The setback levee alignment is within several hundred feet of several sensitive noise receptors (Figure 3.12-1). Therefore, based on the equipment noise levels described above and assuming a noise attenuation rate of 6 dBA/DD, exterior noise levels approximately 100 feet from the part of the existing or setback levee alignment where construction is occurring could be as high as 98 dBA without the use of feasible noise control, and noise levels 200 feet from the construction area could be as high as 92 dBA. This could be considered a substantial increase in noise levels above ambient levels for sensitive receptors. Noise levels in areas within about 6,500 feet of the existing or setback levee alignment could exceed 60 dBA, without feasible noise control, as a result of construction activity.

When the setback levee is being constructed during Stage 1, truck round trips on local roadways are estimated to average approximately 3,390 trips per month or 155 trips per work day over an approximately 14-month construction period (the majority of truck trips associated with construction will occur within the levee setback area). (Refer to Section 3.13, “Transportation and Circulation,” for details on construction traffic during project construction.) During Stage 2 of project construction, the primary trip generating construction activity would be removal of the existing Feather River left bank levee in Segment 2 and placement of the material in borrow sites excavated during Stage 1. Truck round trips on local roadways re estimated to average approximately 2,940 trips per month or 134 truck trips per work day over an approximately 13-month construction period. Typically, a doubling of traffic volumes is required before a noticeable increase (3 dBA) in traffic noise levels occurs. The volume on SR 70 has been estimated at greater than 16,000 vehicles per day. The increase in vehicle truck traffic associated with project construction would not substantially increase traffic volume during peak hours on

SR 70. However, because the roadways in the vicinity are rural in nature and experience a relatively light traffic volume, the project could result in a more noticeable increase in traffic volumes along these roadways. However, the estimated 134–155 truck trips per work day would be spread out over various roadways in the project area as trucks move to and from various portions of the 5+ mile project alignment. No local roadway would be exposed to all truck trips during a particular work day.

During peak construction periods up to approximately 100 employee commute trips could occur in the mornings and evenings, assuming that no ridesharing occurs. Employees would travel to the job site from different directions, using different roadways. Also, given the size of the project, there would likely be more than one staging area where employees would arrive in the morning and park their vehicles. Therefore, no local street would accommodate all employee commute trips. Given these conditions, although construction related vehicle trips will result in some increase in traffic noise along local roadways, this increase is not considered sufficient to cause a substantial increase in noise levels above ambient levels for sensitive receptors.

### **AP Impact 3.12-b: Noise in Excess of Local Noise Regulations**

The Yuba County noise ordinance contains the following regulation that is applicable to the Applicant Preferred Alternative – ASB Setback Levee Alternative:

8.20.310. Construction of Buildings and Projects. It shall be unlawful for any person within a residential zone, or within a radius of 500 feet there from, to operate equipment or perform any outside construction or repair work on buildings, structures, or projects or to operate any pile driver, power shovel, pneumatic hammer, derrick, power hoist, or any other construction type device between the hours of 10:00 p.m. of one day and 7:00 a.m. of the following day in such a manner that a reasonable person of normal sensitiveness residing in the area is caused discomfort or annoyance unless a permit has been duly obtained beforehand from the Director of the Planning and Building Services Department as set forth in Section 8.20.710 of the Noise Ordinance.

At this time, construction of the Applicant Preferred Alternative – ASB Setback Levee Alternative is expected to occur entirely within the time parameters identified in the Yuba County noise ordinance. Therefore no conflict with the noise ordinance would occur. If construction between 10:00 p.m. and 7:00 a.m. is ultimately needed, TRLIA would not initiate this construction until receiving a permit from the Director of the Planning and Building Services Department as identified in the noise ordinance. Therefore, implementation of the Applicant Preferred Alternative – ASB Setback Levee Alternative would be consistent with the Yuba County noise ordinance and would not exceed a local noise regulation. No significant adverse effect would occur related to this significance criterion.

### **AP Impact 3.12-c: Excessive Construction-Generated Vibration Levels**

Construction activities have the potential to result in varying degrees of temporary ground vibration, depending on the specific construction equipment used and operations involved. Ground-vibration levels associated with various types of construction equipment are summarized below in Table 3.12-3, “Typical Construction Equipment Vibration Levels.” Vibration generated by construction equipment typically spreads through the ground and diminishes in magnitude with increases in distance. While effects of ground vibration may be imperceptible at low levels, they may result in detectable vibrations and slight damage to nearby structures at moderate and high levels, respectively. At the highest levels of vibration, damage to structures is primarily architectural (e.g., loosening and cracking of plaster or stucco coatings) and rarely results in structural damage.



| <b>Table 3.12-3</b><br><b>Typical Construction Equipment Vibration Levels</b>                                                                                                                                       |                         |                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------------------------|
| Equipment                                                                                                                                                                                                           | PPV at 25 feet (in/sec) | Approximate Lv at 25 feet |
| Large bulldozer                                                                                                                                                                                                     | 0.089                   | 87                        |
| Caisson drilling                                                                                                                                                                                                    | 0.089                   | 87                        |
| Trucks                                                                                                                                                                                                              | 0.076                   | 86                        |
| Jackhammer                                                                                                                                                                                                          | 0.035                   | 79                        |
| Small bulldozer                                                                                                                                                                                                     | 0.003                   | 58                        |
| Notes: in/sec = inches per second; Lv = velocity level in decibels (VdB) and based on the root mean square (RMS) velocity amplitude;<br>PPV = peak particle velocity<br>Source: Federal Transit Administration 1995 |                         |                           |

Construction operations associated with the Applicant Preferred Alternative – ASB Setback Levee Alternative would be anticipated to include excavators, bulldozers, graders, and trucks, among other miscellaneous pieces of equipment. As shown in Table 3.12-3, groundborne vibration resulting from project construction could therefore result in levels that can exceed the applicable threshold of annoyance (80 VdB) at 25 feet from the vibration source. However, the nearest residential structures are located 50 feet or more from construction equipment travel paths on local roadways, and more than 100 feet from construction activities along the setback levee alignment. Groundborne vibration dissipates rapidly with distance, and vibration levels would not surpass the 80-VdB threshold at nearby residential structures. Note that none of the pieces of construction equipment shown in Table 3.12-3 exceed the vibration threshold of 0.25 in/sec for structural damage. Pile drivers are the primary piece of construction equipment capable of exceeding this threshold, and there are no proposals to use impact pile drivers as part of the Applicant Preferred Alternative. Thus, the temporary construction vibration associated with on-site equipment would not be anticipated to expose sensitive receptors to excessive groundborne vibration and no significant adverse effect would occur.

### 3.12.2.3 INTERMEDIATE SETBACK LEVEE ALTERNATIVE

#### **ISL Impact 3.12-a/b/c: a) Substantial Increase in Noise Levels Above Ambient Levels for Sensitive Receptors; b) Noise in Excess of Local Noise Regulations; c) Excessive Construction-Generated Vibration Levels**

The construction program of the Intermediate Setback Levee Alternative would generally be the same as described above for the Applicant Preferred Alternative – ASB Setback Levee Alternative. Although locations of some project elements would differ, methods of constructing the slurry cutoff wall, foundation preparation, levee embankment construction, utility relocation, removal of the existing levee, relocation of Pump Station No. 3, and other construction elements would be the same. The Intermediate Setback Levee Alternative would follow the same construction schedule as the Applicant Preferred Alternative. Potential borrow areas would be the same as described above for the Applicant Preferred Alternative and would be treated in the same manner. The same haul routes between borrow areas and the setback levee alignment would be used.

Although the location of the northern portion of the levee alignment is further to the west and, therefore, further from noise sensitive land uses in the vicinity, because the construction program, schedule, and methods for the Intermediate Setback Levee Alternative would be very similar to the Applicant Preferred Alternative, the adverse effects associated with increases in ambient noise levels would likewise be very similar.

#### **3.12.2.4 LEVEE STRENGTHENING ALTERNATIVE**

##### **LS Impact 3.12-a/b/c: a) Substantial Increase in Noise Levels Above Ambient Levels for Sensitive Receptors; b) Noise in Excess of Local Noise Regulations; c) Excessive Construction-Generated Vibration Levels**

Although the Levee Strengthening Alternative would require construction equipment similar to the Applicant Preferred Alternative – ASB Setback Levee Alternative along the existing levee and within the Pump Station No. 3 removal area, unlike the Applicant Preferred Alternative, the Levee Strengthening Alternative would not include construction of a setback levee. Consequently, the construction equipment associated with this alternative would be limited mostly to the existing levee alignment and would result in fewer construction noise impacts on sensitive receptors located east of the Applicant Preferred Alternative’s setback area. However, under the Applicant Preferred Alternative, five residential dwelling units located in the setback area would be removed and would not be affected by construction noise generated by the Applicant Preferred Alternative. These residential dwelling units would not be removed under the Levee Strengthening Alternative; therefore, construction noise generated by the Levee Strengthening Alternative would affect five sensitive receptors currently located in the vicinity of the existing levee. For this reason, the Levee Strengthening Alternative would result in similar noise impacts as the Applicant Preferred Alternative in that sensitive receptors would experience an increase in ambient noise levels; however, the number of sensitive receptors affected would be substantially less. It should also be noted that the construction period, and therefore the period of noise generation, would be much shorter for the Levee Strengthening Alternative compared to the Applicant Preferred Alternative.

#### **3.12.2.5 NO-ACTION ALTERNATIVE**

If no permissions were granted to alter the existing levee or discharge dredged or fill material into waters of the United States, construction work necessary to completely repair the Segment 2 levee would not be allowed, and activities would generally be limited to those required for normal levee maintenance. Under these conditions, heavy underseepage and loss of foundation soils would be expected to continue and the threat of another levee failure would remain. Under the No-Action Alternative, it is possible that localized levee repairs (e.g., correction of identified waterside erosion sites) could be authorized under the federal Clean Water Act (CWA) Nationwide Permit (NWP) #3. However, given the limited scale of allowable work under these conditions, the work would be unlikely to cause any significant noise impacts.

If no action was taken to completely repair this deficient levee segment, a levee failure would result in the need for emergency levee repair and cleanup activities using heavy equipment that could temporarily cause substantial noise disturbance. However, substantial flooding that would lead to the need for significant cleanup activities would probably also necessitate the evacuation of nearby residents (i.e., sensitive noise receptors). Therefore, significant noise disturbance associated with the No-Action Alternative is unlikely in the short term. However, permanent repair of the levee breach site, and repair and replacement of structures and facilities damaged during a flood event would generate construction noise that could result in substantial adverse effects on nearby sensitive noise receptors. In the event of a levee breach, large scale emergency repair work would likely require continuous operation of noise generating equipment over a period of weeks, which could result in noise levels that exceed local noise regulations for particular times of day.

#### **3.12.3 MITIGATION**

No mitigation measures are required for the following impacts:

## **Impact AP/ISL/LS 3.12-b: Noise in Excess of Local Noise Regulations**

## **Impact AP/ISL/LS 3.12-c. Excessive Construction-Generated Vibration Levels**

The following mitigation measure would be applied to the **Applicant Preferred Alternative – ASB Setback Levee Alternative, Intermediate Setback Levee Alternative, and Levee Strengthening Alternative** to minimize the exposure of sensitive receptors to construction noise.

### **Mitigation Measure 3.12-a: Implement Noise Control Measures**

TRLIA shall ensure that the primary construction contractor implements the following mitigation measures during construction activities:

- a. To the extent practicable, construction activities shall be limited to the hours of 7:00 a.m. to 10:00 p.m. when operations occur within 500 feet of a residential or other noise-sensitive land use. Decisions as to whether nighttime construction is needed within 500 feet of residential or other noise-sensitive land uses shall only consider the need to maintain human safety and the integrity of the flood control system. Nighttime construction would not be initiated until a permit is received from the Director of the Planning and Building Services Department as identified in the Yuba County noise ordinance.
- b. All construction equipment shall be properly maintained and equipped with noise control, such as mufflers, in accordance with manufacturers' specifications.
- c. To the extent feasible, the simultaneous operation of construction equipment within 50 feet of the project boundary shall be limited.

These measures would minimize the temporary short-term disturbance of noise-sensitive receptors in the vicinity of project construction. With implementation of these measures construction generated noise would not cause a substantial increase in noise levels above ambient levels for sensitive receptors.

In addition, TRLIA shall implement the following measure:

- d. Before construction at each site near noise-sensitive receptors, TRLIA shall provide written notification to potentially affected receptors, identifying the type, duration, and frequency of construction operations. Notification materials would also identify a mechanism for residents to register complaints with TRLIA and Yuba County (the agency responsible for enforcement of the Yuba County noise ordinance) if construction noise levels are overly intrusive or construction occurs outside the permitted hours. TRLIA and/or Yuba County would then take corrective action.

## 3.13 TRANSPORTATION AND CIRCULATION

This section describes the traffic and circulation characteristics of the existing roadways in the project vicinity and analyzes the direct effects of the Applicant Preferred Alternative – Above Star Bend (ASB) Setback Levee Alternative (also referred to as the “Applicant Preferred Alternative”) and other alternatives on normal traffic circulation and transportation systems. Potential project effects on emergency vehicle access and response are discussed in Section 3.14, “Public Services, Utilities, and Service Systems.” Potential indirect effects of the Applicant Preferred Alternative and other alternatives are addressed in Chapter 4.0, “Cumulative and Growth-Inducing Effects.” For example, for an evaluation of the effects to level of service (LOS) from development potentially facilitated by the Applicant Preferred Alternative and other action alternatives, see Section 4.1.2.11, “Transportation and Circulation.” For an evaluation of the combined effects on traffic circulation from implementation of past, present, and future projects in the region, see Section 4.2.4.9, “Transportation and Circulation.”

### 3.13.1 EXISTING CONDITIONS

The primary roadways that would be used to access project construction areas are SR 70, Feather River Boulevard, and local east-west roadways that connect SR 70 and Feather River Boulevard to the existing levee alignment. The major roadways that would be used by construction-related traffic are shown in Figure 3.13-1, “Roads in the Vicinity of the Project Area.” Local roadways and projected construction haul routes were also shown previously in Figure 3.12-1.

#### 3.13.1.1 STATE ROUTE 70

SR 70 provides north-south circulation between Marysville and the Sacramento metropolitan area. SR 70 is a two- and four-lane highway that extends north-south east of the project area. Annual average daily traffic (AADT) volumes for SR 70 include approximately 16,300 trips at the Yuba-Sutter County line and 45,000 trips at the Feather River Boulevard interchange north of project Segment 2 (California Department of Transportation 2006).

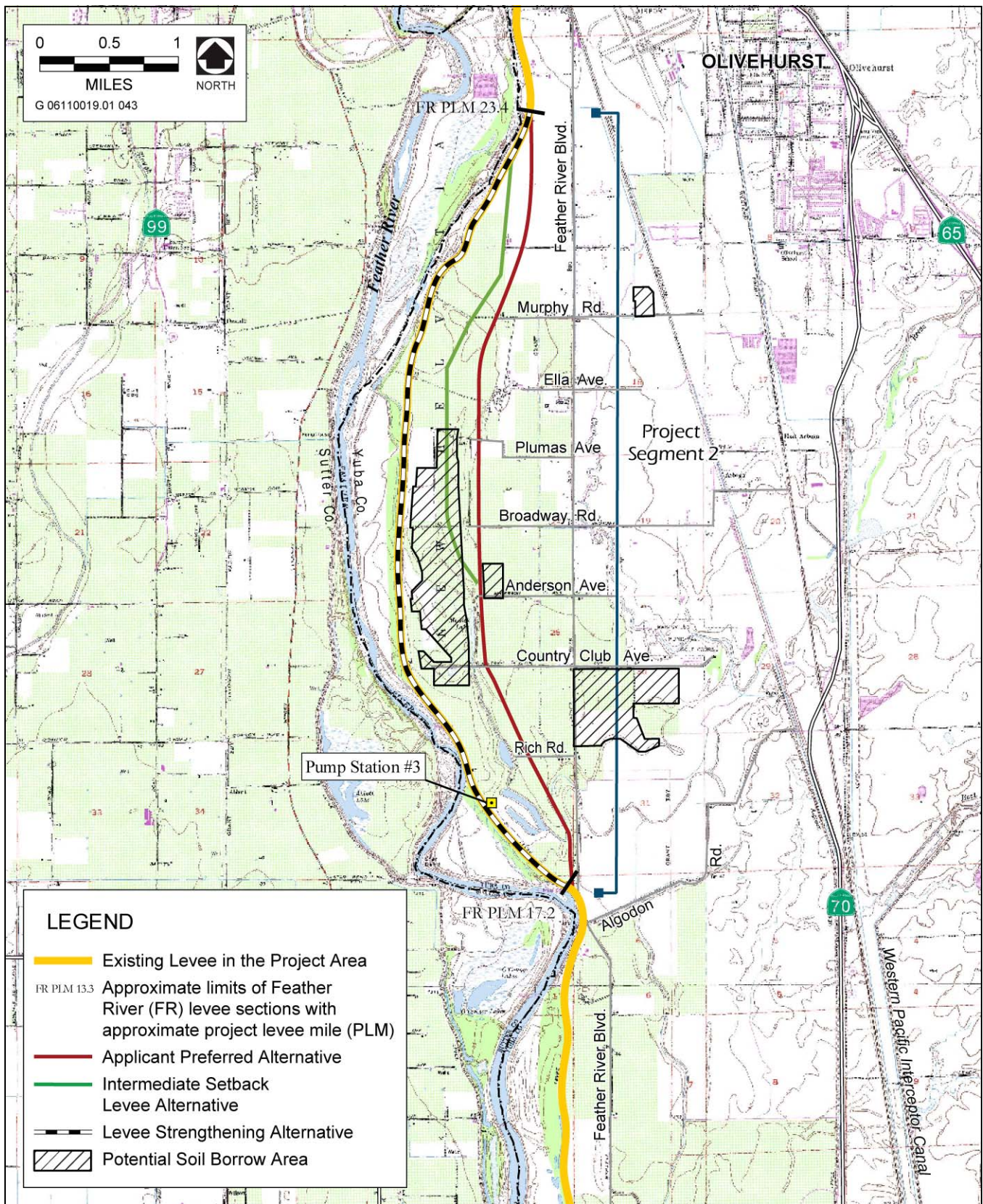
#### 3.13.1.2 FEATHER RIVER BOULEVARD

Feather River Boulevard extends south from Marysville, passing just to the east of project Segment 2. The road serves the community of West Linda and the industrial and agricultural areas of southwest Yuba County. Feather River Boulevard terminates in the south at an at-grade intersection with SR 70, just north of the SR 70 overcrossing of the Bear River. Traffic that typically uses Feather River Boulevard includes agricultural equipment, truck traffic from food processing plants and industrial sites located on Feather River Boulevard, and traffic from residents of the Plumas Lake Specific Plan area. With the addition of traffic from development in the Plumas Lake Specific Plan area, the AADT varies along the various segments of Feather River Boulevard, with a majority of traffic in the Plumas Lake area.

#### Associated Roads

County roads extending west from Feather River Boulevard that may be used by construction personnel and for hauling of construction materials to the project area include Murphy Road, Ella Avenue, Plumas Avenue, Broadway Road, Anderson Avenue, Country Club Avenue, Rich Road, and Algodon Road (Figure 3.13-1). In general, these roads are paved, narrow, nonstriped, two-lane roads that become unpaved roads as they near the Feather River levee access gates within the project area.





Roads in the Vicinity of the Project Area

Figure 3.13-1

## 3.13.2 ENVIRONMENTAL CONSEQUENCES

### 3.13.2.1 SIGNIFICANCE CRITERIA

Thresholds for determining the significance of impacts on transportation and circulation are based in part on guidance developed by the Institute of Transportation Engineers (ITE). For the initial screening of temporary project effects on traffic, ITE recommends that an impact be examined further when it involves an increase of 50 or more trucks, 100 passenger vehicles, or an equivalent combination of vehicles per hour in the peak direction during the peak hour at any roadway intersection (Institute of Transportation Engineers 1989). A project alternative would have a significant impact on transportation and circulation if it would:

- ▶ cause an increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system;
- ▶ cause an increase of 50 or more trucks, 100 passenger vehicles, or an equivalent combination of vehicles per hour in the peak direction during the peak hour at any roadway intersection (ITE recommended threshold);
- ▶ substantially increase traffic hazards on a local roadway;
- ▶ result in inadequate parking capacity; or
- ▶ conflict with adopted policies, plans, or programs supporting alternative transportation.

All construction-related vehicles (i.e., equipment and worker vehicles) would be parked away from any public roadways at construction staging areas. No public parking facilities would be affected by the parking of construction-related equipment and worker vehicles. Therefore, the significance criteria related to parking capacity is not considered further.

None of the project alternatives would affect alternative transportation methods or routes, nor would they conflict with any local plans or policies regarding alternative transportation. Therefore, the significance criteria related to alternative transportation is not considered further.

In addition, as noted above, effects of the project alternatives on emergency access are addressed in Section 3.14, “Public Services, Utilities, and Service Systems,” and are not evaluated in this section. The analysis in this section addresses direct effects of the Applicant Preferred Alternative – ASB Setback Levee Alternative and other alternatives. Potential indirect effects of the Applicant Preferred Alternative and other alternatives are addressed in Chapter 4.0, “Cumulative and Growth-Inducing Effects.” For example, for an evaluation of the effects to LOS from development potentially facilitated by the Applicant Preferred Alternative and other action alternatives, see Section 4.1.2.11, “Transportation and Circulation.” For an evaluation of the combined effects on traffic circulation from implementation of past, present, and future projects in the region, see Section 4.2.4.9, “Transportation and Circulation.”

The Applicant Preferred Alternative and the Intermediate Setback Levee Alternative would cut off the western ends of some roads where they cross the proposed setback levee alignments along project Segment 2. However, these roads are used for access to residences and agricultural operations in the proposed levee setback area. Residences would be removed with implementation of the levee setback and access for these land uses would no longer be needed. Appropriate access for agricultural operations would be provided as needed over the setback levee. The Applicant Preferred Alternative and other alternatives do not include any permanent design features that would present hazards to transportation systems. Therefore, the impact discussions in this section are limited to construction-related effects.



### 3.13.2.2 ASB SETBACK LEVEE ALTERNATIVE

#### **AP Impact 3.13-a: An Increase in Truck Traffic and Passenger Vehicles, or an Equivalent Combination of Vehicles Per Hour in Excess of the ITE Recommended Threshold**

Construction of the Applicant Preferred Alternative – ASB Setback Levee Alternative would have only a temporary effect on traffic. LOS standards established for roads by county congestion management agencies are intended to regulate long-term traffic increases or changes in traffic patterns that result from the development of facilities such as businesses and residences. Because the Applicant Preferred Alternative would not generate traffic or change traffic patterns over the long term, LOS standards are not considered in this evaluation of traffic effects. For the initial screening of temporary project effects on traffic, ITE recommends that an impact be examined further when it involves an increase of 50 or more trucks, 100 passenger vehicles, or an equivalent combination of vehicles per hour in the peak direction during the peak hour at any roadway intersection (Institute of Transportation Engineers 1989).

Personnel, equipment, and imported materials would reach the project site via SR 70 and Feather River Boulevard, which are paved, all-weather roads, and suitable for the anticipated loads. The construction labor force is estimated to average about 60–70 persons over the construction period. Peak staffing could be close to 100 depending on the contractor's schedule. Members of the construction crew are expected to travel to the project area from different directions, with overall traffic spread among various roadways and intersections, and it is also likely that some ridesharing would take place. Therefore, although construction staff traffic could potentially generate 100 commute trips during peak construction periods, commute traffic is not expected to exceed the ITE threshold of an increase in traffic volume of 100 vehicles in the peak direction during the peak hour at any individual intersection.

Transport of construction equipment and materials to the project site would mostly occur during Stage 1 of the project (see Table 2-2 in Chapter 2, "Alternatives"). It is expected that about 40 trailer ("low-boy") truck round trips would be required to transport the contractor's plant and equipment listed above to the site. Necessary aggregate base and rock revetment material would be obtained from a commercial sand and gravel operation, most likely in the Marysville–Yuba City area. The construction contractor would select the specific supplier based on suitability and pricing. About 2,000 highway truck trips would be needed to bring the aggregate base and rock revetment material to the site from the quarry of origin. About 300 truckloads would be needed to bring dry bentonite to the site. The bentonite would probably be processed in Wyoming or South Dakota and transported to the Marysville–Yuba City area by rail. About 20 trailer truckloads would be required to bring other permanent materials to the site, such as geotextile fabric, erosion control materials, structural steel, piping, utility poles, well casings, and ancillary equipment. About 100 concrete loads, transported by transit mixer truck, are also likely. The total estimated number of truck trips originating outside the construction area during Stage 1 would be 2,460.

Within the construction areas, the main sources of construction traffic during Stage 1 would be the required transport of borrow material for setback levee construction. Transport of an estimated 3.6 million cu. yd. of borrow material from sites located both west and east of the setback levee alignment would require approximately 180,000 haul trips if a load of 20 cu. yd. per trip is assumed. Larger haul unit sizes would reduce the number of trips. It is also assumed that 75 percent of the borrow material will be extracted from areas west of the proposed setback levee alignment and that 25 percent will be extracted from the borrow sites to the east of the alignment (the site west of the alignment is closer to the work area and would be the preferred borrow source). Using these assumptions, approximately 135,000 haul trips would originate from the potential borrow area west of the proposed setback levee alignment and approximately 45,000 trips would originate from the potential borrow area sites east of the alignment. Only trips associated with the potential borrow areas or other sources east of the setback levee alignment would interact with traffic on local roadways, as local traffic would be excluded from sites west of the setback levee alignment during construction (structures located within the existing setback area would be abandoned and removed prior to the initiation of construction). Mobilization and construction activities during Stage 1 would generally be spread over a 14-month period, based on the anticipated receipt of federal

authorizations in November 2008 and the resulting construction schedule shown in Table 2-2. By combining truck trips originating several miles beyond the construction site with those that originate from areas nearer to the levee setback area, the Applicant Preferred Alternative would place a total of approximately 47,460 trucks on local roadways. Assuming a 14-month construction period during Stage 1 and 22 days of construction per month, the project would place approximately 155 truck trips per day on local roadways. These trips would be spread out over the work day and would also be spread geographically, as work would occur simultaneously in several locations along the project alignment. For example, the construction area for the setback levee is linear and extends over 5.7 miles. Therefore, construction trips would be spread geographically over different roadways and intersections. For these reasons, it is very unlikely that truck traffic would exceed the ITE threshold of 50 trucks per hour in a peak hour in a peak direction at a single intersection, or that commute traffic and truck haul traffic combined would exceed the equivalent threshold for a mix of passenger vehicles and trucks during a peak hour in a peak direction at a single intersection.

Removal of the existing Segment 2 levee, removal of construction debris from the project site, reclamation of borrow areas east of the setback levee, and demobilization activities would mostly occur over a 13-month period during Stage 2 of the project, based on the anticipated receipt of federal authorization in November 2008 and the resulting construction schedule shown in Table 2-2. Approximately 150,000 haul trips would be required to move an estimated 3.0 million cu. yd. of material during levee degradation. It is assumed that approximately 75 percent of these trips (112,500) would move between the existing levee and borrow areas developed west of the setback levee. The remaining trips (37,500) would travel east of the setback levee and could interact with traffic on local roadways. About 650 highway truckloads may be needed to carry demolition debris, construction debris, and waste materials to a suitable landfill. About 40 trailer truck round trips would be needed to remove construction equipment from the site as the work is completed. The Applicant Preferred Alternative would place a total of approximately 38,190 trucks on local roadways. Assuming a 13-month construction period during Stages 2 and 22 days of construction per month, the project would place approximately 134 truck trips per day on local roadways. As described for Stage 1, truck trips during Stage 2 would be divided among different roadways in the project area at different times of the day, and it is unlikely that truck traffic would exceed the ITE threshold in a peak hour in a peak direction at a single intersection. It is also unlikely that commute traffic and truck haul traffic combined would exceed the equivalent threshold for a mix of passenger vehicles and trucks during a peak hour in a peak direction at a single intersection.

During the entire construction period under the Applicant Preferred Alternative, commute trips and truck haul trips would increase traffic on Feather River Boulevard, SR 70, and local roadways. However, the construction-related trips would not exceed the thresholds established by ITE at any time or substantially increase overall traffic levels on the local road system.

### **AP Impact 3.13-b: Substantial Increase in Traffic Hazards on a Local Roadway**

Trucks and workers entering and exiting the construction area are likely to move directly between Feather River Boulevard and entrances to the construction area. Many of these vehicles would also enter and exit SR 70. At times, the presence of slow-moving trucks entering or exiting construction areas could pose hazards to other vehicles on Feather River Boulevard and SR 70. In addition, trucks and other vehicles could track mud and gravel onto the local roadways, potentially posing a driving hazard. This would result in a substantial adverse effect.

#### **3.13.2.3 INTERMEDIATE SETBACK LEVEE ALTERNATIVE**

### **ISL Impact 3.13-a/b: a) An Increase in Truck Traffic and Passenger Vehicles, or an Equivalent Combination of Vehicles Per Hour in Excess of the ITE Recommended Threshold; b) Substantial Increase in Traffic Hazards on a Local Roadway**

The construction program of the Intermediate Setback Levee Alternative would generally be the same as described above for the Applicant Preferred Alternative – ASB Setback Levee Alternative. Although locations of

some project elements would differ, methods of constructing the slurry cutoff wall, foundation preparation, levee embankment construction, utility relocation, removal of the existing levee, relocation of Pump Station No. 3, and other construction elements would be the same. The Intermediate Setback Levee Alternative would follow the same construction process and construction schedule as the Applicant Preferred Alternative. The same roadways would be used for construction access. Like the Applicant Preferred Alternative, it is estimated that under the Intermediate Setback Levee Alternative, approximately 3.6 million cu. yd. of material would be required for setback levee construction. Potential borrow areas would be the same as described above for the Applicant Preferred Alternative and would be treated in the same manner.

Because the construction program, schedule, and access routes under the Intermediate Setback Levee Alternative would be the same as the Applicant Preferred Alternative, effects on traffic would also be the same.

#### **3.13.2.4 LEVEE STRENGTHENING ALTERNATIVE**

##### **LS Impact 3.13-a/b: (a) An Increase in Truck Traffic and Passenger Vehicles, or an Equivalent Combination of Vehicles Per Hour in Excess of the ITE Recommended Threshold; (b) Substantial Increase in Traffic Hazards on a Local Roadway**

This alternative would involve repairs and improvements to the existing Feather River levee along Segment 2. No setback levee would be constructed. A construction period of about 8 months, beginning in the first spring after detailed designs are completed, is assumed for levee repairs and strengthening.

Requirements for borrow material would be substantially less under the Levee Strengthening Alternative than alternatives incorporating a setback levee because the existing levee would be retained and soil for a setback levee would not be necessary. In addition, material excavated from the slurry cutoff wall trenches would be used to the extent practicable, reducing the need for borrow material from off-site sources. However, it is still estimated that a total of approximately 1.4 million cu. yd. of borrow material would be required for levee repair and strengthening activities.

Because of the nature of the work under the Levee Strengthening Alternative, it is expected that only a limited amount of excess materials (e.g., soil, cleared vegetation) would be generated. Excess excavated materials would be placed in a local disposal area on-site, or hauled off-site and placed in a suitable disposal area.

Personnel, equipment, and imported materials would reach the site via SR 70 and Feather River Boulevard, which are paved, all-weather roads, and suitable for the anticipated loads. The construction labor force is estimated to average about 50–60 persons over the construction period. Peak staffing could be close to 100 depending on the contractor's schedule.

It is expected that about 40 trailer ("low-boy") truck round trips would be required to transport the contractor's plant and equipment listed above to the site. A similar number of round trips would be needed to remove the equipment from the site as the work is completed.

The sources and modes of transport for construction materials would be the same as described for the proposed action. About 3,000 highway truck trips would be needed to bring the aggregate base and rock revetment material to the site from the quarry of origin. About 200 truckloads would be needed to bring dry bentonite to the site. About 200 truckloads would be needed to bring cement to the site. Another 20–25 trailer truckloads would be required to bring other permanent materials to the site, such as geotextile fabric, erosion control materials, structural steel, piping, well casings, and ancillary equipment. About 75 concrete loads, transported by transit mixer truck, are also likely. In addition, about 75 highway truckloads may be needed to carry demolition debris, construction debris, and waste dump materials to a suitable landfill.

At the project site, the primary construction corridor would include the crests of the existing Feather River levee, landside toe of the existing levees, and roads used for access to the work area, including Feather River Boulevard.

Access roads would consist mainly of the existing east-west lateral roads between SR 70, Feather River Boulevard, and the existing levee.

Within the construction area, the main sources of construction traffic would be the installation of the slurry cutoff wall, required transport of material for the slurry cutoff wall (including borrow from borrow sites), and required transport of borrow material for berm construction and restoration of levee heights (e.g., where the tops of levees were cut down to provide a work surface for installation of the slurry cutoff wall). Transport of an estimated 1.4 million cu. yd. of borrow material would require approximately 70,000 haul trips if a load of 20 cy per trip is assumed. Larger haul unit sizes would reduce the number of trips.

The Levee Strengthening Alternative would generate approximately 73,415 truck trips over a total construction period of approximately 8 months. Therefore, assuming 22 days of construction per month, the alternative would generate approximately 417 truck trips per day, or roughly two to three times the estimated trips per day placed on local roadways by the Applicant Preferred Alternative – ASB Setback Levee Alternative during Stages 1 and 2 of the project. However, not all truck trips generated by the Levee Strengthening Alternative would utilize local roadways. The existing levee alignment would be used extensively as a transportation corridor for construction activities. In addition, most of the construction activity would be kept in the immediate vicinity of the existing levee alignment. Many of the truck trips that did use local roadways would remain near the western terminus local roads where there is little existing traffic. Truck trips that do use local roadways would be spread out over the work day and would also be spread geographically, as work would occur simultaneously in several locations along the project alignment. Therefore, construction trips would be spread geographically over different roadways and intersections. For these reasons, it is unlikely that truck traffic would exceed the ITE threshold of 50 trucks per hour in a peak hour in a peak direction at a single intersection, or that commute traffic and truck haul traffic combined would exceed the equivalent threshold for a mix of passenger vehicles and trucks during a peak hour in a peak direction at a single intersection.

Similar to the Applicant Preferred Alternative, the Levee Strengthening Alternative would also include the presence of slow-moving trucks entering or exiting construction areas, which could pose hazards to other vehicles on Feather River Boulevard and SR 70. In addition, trucks and other vehicles could track mud and gravel onto the local roadways, potentially posing a driving hazard.

### **3.13.2.5 NO-ACTION ALTERNATIVE**

If no permissions were granted to alter the existing levee or discharge dredged or fill material into waters of the United States, no changes to existing traffic patterns or local roadways would occur. Under these conditions, heavy underseepage and loss of foundation soils would be expected to continue and the threat of another levee failure in the Segment 2 project area would remain. Under the No-Action Alternative, it is possible that localized levee repairs (e.g., correction of identified waterside erosion sites) could be authorized under the federal Clean Water Act (CWA) Nationwide Permit (NWP) #3. This work would be unlikely to affect traffic on local roadways.

If no action was taken to completely repair this deficient levee segment, a levee failure in Segment 2 would probably cause significant damage to local roadways, and traffic circulation could be substantially affected on local roadways and SR 70. In addition, even if a levee failure did not occur, the lack of increased flood protection associated with the No-Action Alternative would likely lead to a reduction in public services, including upkeep of roadways, as the housing market and local economy decline. Therefore, the No-Action Alternative is expected to adversely affect the local transportation and circulation systems.

### 3.13.3 MITIGATION

No mitigation measure is required for the following impact:

#### **Impact AP/ISL/LS 3.13-a: An Increase in Truck Traffic and Passenger Vehicles, or an Equivalent Combination of Vehicles Per Hour in Excess of the ITE Recommended Threshold**

The following mitigation measure would be applied to the **Applicant Preferred Alternative – ASB Setback Levee Alternative, Intermediate Setback Levee Alternative, and Levee Strengthening Alternative.**

#### **Mitigation Measure 3.13-b: Implement Measures to Reduce Hazards to Vehicles on Local Roadways**

To reduce hazards to vehicles on local roadways, TRLIA shall ensure that its primary construction contractor implements the following measures:

(a) **Develop and implement a traffic safety plan in coordination with the County and Caltrans.**

The construction contractor shall develop a plan for traffic safety assurance for the county roadways in the project vicinity. The contractor shall submit the plan to the County Public Works Department for approval before the initiation of construction-related activity that could adversely affect traffic on county roadways. A similar plan shall be prepared for SR 70 and submitted to Caltrans for review before initiation of construction-related activity that could adversely affect traffic on the highway. If both the County and Caltrans will accept the same traffic safety plan, then only one plan need be prepared. The plan(s) may call for the following elements, based on the requirements of each agency:

- ▶ posting warnings about the potential presence of slow-moving vehicles;
- ▶ using traffic control personnel when appropriate;
- ▶ scheduling truck trips outside of peak morning and evening traffic periods to the extent feasible;
- ▶ placing and maintaining barriers and installing traffic control devices necessary for safety, as specified in Caltrans's *Manual of Traffic Controls for Construction and Maintenance Works Zones* and in accordance with County requirements; and
- ▶ maintaining routes for passage of emergency response vehicles through roadways affected by construction activities.

The contractor shall train construction personnel in appropriate safety measures as described in the plan(s), and shall implement the adopted plan(s).

(b) **Minimize the accumulation of mud and dirt on local roadways.** All operations shall limit or expeditiously remove the accumulation of project-generated mud or dirt from adjacent public streets at least once every 24 hours when operations are occurring. The construction contractor shall sweep the paved roadways (water sweeper with reclaimed water recommended) at the end of each day if substantial volumes of soil material have been carried onto adjacent paved, public roads from the project sites. Also see a similar requirement under Mitigation for Air Quality impacts related to the implementation of FRAQMD pollution-control measures to minimize temporary emissions of ROG, NO<sub>x</sub>, and PM<sub>10</sub> during construction.

## **3.14 PUBLIC SERVICES, UTILITIES, AND SERVICE SYSTEMS**

Public services addressed in this section are limited to emergency services (fire, police, and emergency medical services). Schools, parks, and other public facilities are not discussed because the Applicant Preferred Alternative – Above Star Bend (ASB) Setback Levee Alternative (also referred to as the “Applicant Preferred Alternative”) and other alternatives would neither directly affect these facilities nor result in a need for new or physically altered schools, parks, or other public facilities. This section also addresses several utility systems: gas, electrical, water, sewer, cable, telephone, and drainage systems. Wastewater and solid-waste systems are not discussed because the Applicant Preferred Alternative and other alternatives would not directly result in the production of wastewater or the long-term production of solid waste.

The analysis of project effects in this section addresses direct effects of the Applicant Preferred Alternative – ASB Setback Levee Alternative and other alternatives. Indirect effects of the Applicant Preferred Alternative and other alternatives are addressed in Chapter 4.0, “Cumulative and Growth-Inducing Effects.” For example, for an evaluation of the effects related to the increased demands for public services and facilities (e.g., wastewater treatment, solid waste disposal, law enforcement, and parklands) from development potentially facilitated by the Applicant Preferred Alternative and other action alternatives, see Section 4.1.2.12, “Public Services, Utilities, and Parks and Recreation.” For an evaluation of the combined effects on public utility infrastructure and emergency response times from implementation of past, present, and future projects in the region, see Section 4.2.4.10, “Public Services, Utilities, and Service Systems.”

### **3.14.1 EXISTING CONDITIONS**

#### **3.14.1.1 SERVICE PROVIDERS**

Most of the project area is in the Olivehurst Public Utility District (OPUD) water and sewer sphere of influence. For a majority of the Segment 2 area there is no OPUD water or sewer lines, and local residents and businesses rely on wells and septic systems.

RD 784 manages a majority of the storm drainage systems in the project area. (Shaw, pers. comm., 2006). PG&E maintains the electrical and gas lines in the project area, and AT&T (formerly SBC Communications) maintains the telephone infrastructure. Comcast is the local cable television provider.

The Linda Fire Protection District provides fire protection for the majority of Segment 2. OPUD provides fire protection for a small portion of Segment 2 from Ella Avenue north to the Yuba County Airport (Shaw, pers. comm., 2006). The nearest staffed Linda Fire Protection District station is on Scales Road in Linda (Cucci, pers. comm., 2006). The County Sheriff’s Department provides police protection for the project area.

#### **3.14.1.2 EXISTING PUBLIC SERVICES, UTILITIES, AND SERVICE SYSTEMS**

Public utilities and associated structures in project Segment 2 consist primarily of infrastructure related to agricultural operations (electrical lines and drainage improvements), telephone lines, and a PG&E high-voltage electrical transmission line.

The PG&E 115-kV high-voltage transmission line referred to as the Bogue Loop line crosses the northern end of project Segment 2 between Ella and Murphy Roads and is supported by steel transmission towers. Several PG&E overhead electrical lines on wooden poles also extend into the area. Lines and tributaries run from the east into the project area at Ella Road, West Ella Avenue, Broadway, and Country Club Avenue on approximately 120 poles. These lines provide electricity to residences and agricultural operations. The two lines that are parallel to Ella Avenue and Country Club Avenue pass through the proposed levee setback area and continue west of the existing levee (Pacific Gas and Electric Company 2001). These distribution lines service existing river diversion pumps across the Feather River.



Aboveground telephone poles and lines, as well as some buried lines, lead from the telephone lines that run along Feather River Boulevard into the proposed levee setback area to serve individual homes. Aboveground telephone lines are typically attached to the wooden poles supporting electrical lines described above.

RD 784 maintains the Lateral 6 Canal, which lies entirely within and drains portions of the proposed levee setback area; the Lateral 7/8 Canal, which crosses the setback levee alignments being considered and empties from the east into Lateral 6; and the Plumas Lake Canal, which drains out of Algodon Canal and crosses the setback levee alignments being considered near the south end. Both the Lateral 6 Canal and the Plumas Lake Canal drain into a pond. The water in this pond is pumped over the levee into the Feather River floodway by RD 784 Pump Station No. 3. In addition to these public utilities and service systems, approximately 20 privately owned wells and several private irrigation lines serve land and facilities along project Segment 2 (Yuba County Water Agency 2003a).

### **3.14.2 ENVIRONMENTAL CONSEQUENCES**

#### **3.14.2.1 SIGNIFICANCE CRITERIA**

A project alternative would have a significant impact on public services, utilities, and service systems if it would:

- ▶ increase risk of structural failure of, or substantially interfere with service from, existing gas facilities and pipelines, electrical transmission or distribution lines, telephone lines, drainage improvements, or water distribution facilities;
- ▶ increase demand for emergency services, power or natural gas facilities, communications systems, water infrastructure, sewer lines, or solid-waste services beyond their current capacity, resulting in substantial adverse physical changes associated with meeting the increased demand; or
- ▶ increase response times for emergency service providers.

Because Segment 2 of the FRLRP does not include new development, it would not directly result in demand for increased electricity or natural gas facilities, communication systems, water infrastructure, sewer lines, or solid-waste services beyond their current capacity. The analysis of project effects in this section addresses direct effects of the Applicant Preferred Alternative – ASB Setback Levee Alternative and other alternatives. As discussed above, the potential for the Applicant Preferred Alternative – ASB Setback Levee Alternative and other alternatives to indirectly result in increased demand for public services and utilities are evaluated in Sections 4.1.2.12 and 4.2.4.10 of Chapter 4.0 “Cumulative and Growth-Inducing Effects.”

The detailed design plans for the new Pump Station No. 3 show a discharge capacity of 52 cubic feet per second, which is equal to the design capacity of the existing pump station, and it is assumed that the power requirement would be approximately the same for the new facility. Therefore, increased demand for these services is not evaluated further. Effects (or lack thereof) of the Applicant Preferred Alternative and other alternatives on local drainage systems are addressed in Section 3.3, “Surface and Groundwater Hydrology and Geomorphology.”

#### **3.14.2.2 APPLICANT PREFERRED ALTERNATIVE – ASB SETBACK LEVEE ALTERNATIVE**

##### **AP Impact 3.14-a: Increase in Risk of Structural Failure of, or Substantial Interference with Service from Existing Gas Facilities and Pipelines, Electrical Transmission or Distribution Lines, Telephone Lines, or Water Distribution Facilities**

All of the telephone lines and most of the electrical lines in the proposed levee setback area serve the existing residences and agricultural wells, buildings, and pump station in the levee setback area and terminate there. Most of these structures and facilities, with the exception of some irrigation wells to support ongoing agricultural

operations in the setback area, would need to be removed before the setback levee is completed and the floodway is expanded, halting the need for continued service to the removed structures and facilities. Those electrical and telephone lines that currently serve existing uses that are planned for removal, would be removed as well, and no service disruption would be associated with their removal.

In addition to the electrical lines that terminate in the proposed levee setback area, the PG&E Bogue Loop 115-kV high-power transmission line and two PG&E distribution lines cross the levee setback area. The Bogue Loop line crosses the northern end of the proposed levee setback area in an east-west direction and continues into Sutter County west of the project area. The other lines parallel Ella and Country Club Avenues and terminate west of the existing levee. It is assumed that all of these lines would need to be maintained to continue to serve existing uses. However, with implementation of the levee setback, the lower parts of the transmission towers and poles supporting these lines within the levee setback area would be subject to periodic flooding and could be damaged by the force of flood waters in the expanded floodway. Reinforcement or replacement of these structures would be necessary, as well as raising the elevation of the distribution lines where they cross over the setback levee. As described in Chapter 2, “Alternatives,” in response to the Applicant Preferred Alternative – ASB Setback Levee Alternative, PG&E would replace the Bogue Loop transmission towers with new towers along the same alignment that would withstand flooding in the setback area and raise the distribution lines the necessary distance above the setback levee. The Yuba County Airport is a general aviation facility located northeast of the levee setback area. The replacement tower nearest to the airport would be approximately 1.5 miles from the approach end of the nearest runway and 60 degrees off the extended centerline of this runway. Yuba County regulates the height of structures and the use of property near the airport to ensure aviation safety in Chapter 12.75 of its municipal code. The distance and angle of the nearest raised tower from the approach end of the nearest runway, designated Runway 32, appear to preclude the replacement towers from height restrictions established to maintain safe conditions for approaching aircraft. However, based on height zones contained in the code (Section 12.75.040), it is possible that the nearest replacement towers may be within an area where a height restriction of 150 feet, as measured from finished grade, has been established (Palmeri, pers. comm., 2008). The reconstructed transmission towers would be below this limit, at heights of 110–120 feet, and therefore would not adversely affect airport operations (Hansen, pers. comm., 2008).

The two power distribution lines that service existing river diversion pumps—one line just south of the 115-kV transmission line paralleling Ella Avenue, and the other paralleling Country Club Avenue—cross the Feather River. These two lines would remain in place, but the poles in the levee setback area may need reinforcement. This would also apply to power lines serving irrigation wells to be retained in the setback area. The lines may need to be upgraded where they cross the setback levee to provide the appropriate clearance in accordance with California Code of Regulations (CCR) Section 123. New distribution lines would be installed to service replacement wells outside the setback area and relocated pump stations.

It can be assumed that the levee setback would not have a significant adverse effect on most electrical service and all telephone services that currently terminate in the levee setback area because, as described above, with the exception of some wells, these facilities would be removed along with the residences and any other structures they serve. However, the steel towers supporting PG&E’s Bogue Loop, the wooden poles supporting the PG&E electrical distribution lines that cross the levee setback area, and power poles retained to serve wells remaining in the setback area, could be damaged by flood waters and/or soil borrow activities if these structures are not reinforced adequately before construction of the setback levee. Electrical service inside and outside the levee setback area could be disrupted if these facilities are damaged.

In addition, although service providers have been contacted for information on the locations of utility infrastructure and surveys of the facilities have been conducted, it is possible that some utilities that could be affected by project implementation may not have been identified.

Construction activity has the potential to affect both identified and unidentified electrical, natural-gas, and telephone infrastructure remaining in the levee setback area, and flood water passing through the levee setback area could damage any infrastructure that remains there, possibly resulting in interruption of service.

If RD 784 Pump Station No. 3 were left in its current location, it would be inundated by flood waters with implementation of the levee setback and resulting expansion of the floodway. However, the Applicant Preferred Alternative includes the relocation of Pump Station No. 3 to the land side of the proposed setback levee. Therefore, there would be no significant adverse effects on this facility.

Privately owned wells, water fill stations (facilities where well water is used to fill water tanks), and irrigation systems in the proposed levee setback area could be inundated by flood waters, and irrigation systems would also be cut off at the setback levee alignment. In addition, water supply and drainage facilities could be damaged by soil borrow activities. All residences and some agricultural uses that rely on these wells and the water fill stations would be removed from the levee setback area with project implementation, and the facilities that service them would no longer be needed. However, wells and irrigation systems would be needed for agricultural operations that could continue in the levee setback area.

Approximately 20 wells have been identified within the proposed levee setback area. Standards and requirements for wells are described in DWR Bulletins 74-81 and 74-91 (California Department of Water Resources 1981, 1991). In general, one of the objectives of the standards is to prevent surface waters from entering wells that draw usable groundwater supplies of superior quality. Wells are required to be located and constructed so that the top of the well casing terminates above known levels of flooding by drainage or runoff from the surrounding land, unless this is impracticable and the enforcing agency specifies an alternative means of protection. It is assumed that this requirement would apply to existing wells in the levee setback area. Destruction of the wells within the levee setback area and replacement with wells outside the area is presumed to be more feasible under most circumstances than protecting the existing wells, which might require raising and reinforcing power lines and transformers, modifying casings or installing special valves, changing out pumps, and relocating electrical controls; however, modification of existing wells is not precluded as an option for continuing water supply in the levee setback area (Pujol, pers. comm., 2006). As indicated previously, some wells may still be retained in the setback area. Although most of these wells service land and facilities entirely within the levee setback area, some may also supply water to the land east of this area. Therefore, if wells are destroyed, some replacement wells may have to be installed on the land side of the setback levee. In addition, other wells may have to be installed on the land side of the setback levee to irrigate land within the levee setback area that would continue in agricultural production.

Irrigation pipelines are buried beneath the surface of the levee setback area. Surface manifestations include irrigation risers and standpipes. All irrigation lines would be removed from within the footprint of the setback levee and associated toe easements. Within the levee setback area, lines that are to be abandoned would be plugged and abandoned in place. Risers, standpipes, and other aboveground portions of irrigation lines would be removed. However, irrigation lines would be required to remain within the levee setback area to irrigate the land that would continue in agricultural production. It has been assumed that such existing lines would be connected to modified existing wells, or replacement irrigation wells by means of new lines that would cross the setback levee. Pipeline crossings of the setback levee would be designed in accordance with CCR Section 123.

Design of the levee setback has included coordination with RD 784 and local landowners to relocate pumps and replace wells and irrigation systems as needed. Replacement of privately owned water supply and delivery facilities (wells and irrigation systems) would depend on the extent of the need for continued irrigation of crops throughout the levee setback area. Such replacement would be considered as part of the land management planning for the levee setback area that TRLIA would conduct with landowners, resource agencies, and other stakeholder groups in final design for the setback levee. Impacts of the levee setback on drainage in the levee setback area are addressed in Section 3.3, "Surface and Groundwater Hydrology and Geomorphology."

The public-service impact of the levee setback on water supply and drainage facilities that could be damaged by construction activity (i.e., excavation) or through inundation would not be substantial.

As described above, electrical and telephone lines that currently serve existing uses are planned for removal. Other utility infrastructure would also be removed from the levee setback area. Regardless of the plans, construction activity has the potential to affect unidentified electrical, natural-gas, and telephone infrastructure that is currently present in the levee setback area. Flood water passing through the levee setback area could damage any infrastructure that remains there, possibly resulting in interruption of service. Any inadvertent damage to infrastructure or interruption of service could result in a significant adverse effect.

#### **AP Impact 3.14-b: Increase in Response Time for Emergency Service Providers**

Feather River Boulevard provides access for emergency vehicles to areas of southwestern Yuba County and to the Feather River (via the Star Bend Boat Launch and Fishing Access). No accidents related to river recreation that required emergency response have occurred in several years. Development in this part of the county that is accessed by Feather River Boulevard is relatively sparse, including scattered rural residences and two fruit packing warehouses. Emergency access from SR 70 to areas near this roadway is generally expected to be related to fire-control during dry months and flood control during wet months (Boeck, pers. comms., 2002 and 2004).

It is important that access to areas along Feather River Boulevard during project construction remains open for emergencies related to late season flood events, and particularly for potential fire-control events during the dry season. The increased traffic on Feather River Boulevard from trucks and other vehicles associated with setback levee construction and removal of construction debris and materials from levee degradation could increase emergency response times and otherwise make access to the area more difficult for emergency service providers, potentially resulting in a significant adverse effect.

#### **3.14.2.3 INTERMEDIATE SETBACK LEVEE ALTERNATIVE**

##### **ISL Impact 3.14-a: Increase in Risk of Structural Failure of, or Substantial Interference with Service from Existing Gas Facilities and Pipelines, Electrical Transmission or Distribution Lines, Telephone Lines, or Water Distribution Facilities**

The Intermediate Setback Levee Alternative would match the alignment of the Applicant Preferred Alternative – ASB Setback Levee Alternative for approximately 1.6 miles in the south and then would follow an alignment approximately 1,000 feet (maximum) to the west of the Applicant Preferred Alternative levee alignment. The effects of this alternative would be similar to the Applicant Preferred Alternative; however, the extent of affected utilities would be somewhat less under the Intermediate Setback Levee Alternative because the levee alignment is located farther to the west, resulting in a smaller setback area and effects on fewer facilities.

##### **ISL Impact 3.14-b: Increase in Response Time for Emergency Service Providers**

The Intermediate Setback Levee Alternative would match the alignment of the Applicant Preferred Alternative – ASB Setback Levee Alternative for approximately 1.6 miles in the south and then would follow an alignment approximately 1,000 feet (maximum) to the west of the Applicant Preferred Alternative levee alignment. The effects of this alternative on emergency vehicle movement and emergency service response times would be similar to the Applicant Preferred Alternative.

#### **3.14.2.4 LEVEE STRENGTHENING ALTERNATIVE**

##### **LS Impact 3.14-a: Increase in Risk of Structural Failure of, or Substantial Interference with Service from Existing Gas Facilities and Pipelines, Electrical Transmission or Distribution Lines, Telephone Lines, or Water Distribution Facilities**

Various aboveground and buried utility lines and water supply and drainage infrastructure identified in the project area either are near or cross the Feather River Segment 2 levee segment. The potential exists for additional buried gas, electrical, cable television, telephone lines, or water supply and drainage facilities that have not already been identified to be located near or to cross these areas. Construction activities associated with implementation of the Levee Strengthening Alternative could cause minor damage to public utility infrastructure, water supply and drainage infrastructure, or temporarily disrupt these services. However, consultation has been undertaken, and continues with all potential service providers and appropriate agencies and individuals responsible for utility infrastructure, to identify utility line and facility locations and appropriate protection measures. Consultation would continue during construction to ensure avoidance/protection of these utilities as construction proceeds. Implementation of this alternative would not result in substantial interference with gas, electrical, cable television, telephone, water supply, or drainage service.

##### **LS Impact 3.14-b: Increase in Response Time for Emergency Service Providers**

As described above, Feather River Boulevard provides access for emergency vehicles to areas of southwestern Yuba County and to the Feather River (via the Star Bend Boat Launch and Fishing Access). Construction under the Levee Strengthening Alternative would occur over a period of approximately 8 months. It is important that access to areas along Feather River Boulevard remains open for emergencies related to late-season flood events, and particularly for potential fire-control events during the dry season. The increased traffic on Feather River Boulevard from trucks and other vehicles associated with levee repair and strengthening activities could increase emergency response times and otherwise make access to the area more difficult for emergency service providers, potential resulting in a significant adverse effect.

#### **3.14.2.5 NO-ACTION ALTERNATIVE**

If no permissions were granted to alter the existing levee or discharge dredged or fill material into waters of the United States, no changes to existing land uses in the levee setback area would occur and removal or relocation of utility service lines and infrastructure would not be required. Under these conditions, heavy underseepage and loss of foundation soils would be expected to continue and the threat of another levee failure in the Segment 2 project area would remain. Under the No-Action Alternative, it is possible that localized levee repairs (e.g., correction of identified waterside erosion sites) could be authorized under the federal Clean Water Act (CWA) Nationwide Permit (NWP) #3. This work would be unlikely to affect existing utilities in the Segment 2 project area.

If no action was taken to completely repair this deficient levee segment and another levee failure occurred,, transportation and communication systems could be substantially adversely affected in the RD 784 area. If a levee failure occurred in Segment 2, flooding of roadways could substantially affect the ability of emergency responders to move through the project area in the short term and in the long term if damaged facilities cannot be repaired quickly. In addition, substantial damage could occur to utility infrastructure, including regional distribution elements such as the Bogue Loop electrical transmission line. Damage to utility infrastructure resulting from a levee failure and associated flooding could result in prolonged service interruptions both in the RD 784 and surrounding communities.

Even if a levee failure did not occur, the lack of increased flood protection associated with the No-Action Alternative would limit the construction of schools and other public services facilities needed to serve existing development in the RD 784 area. This situation would likely lead to a diminishment of public services in general as the housing market and local economy decline because of the lack of adequate flood protection. Therefore, the

No-Action Alternative is expected to adversely affect the provision of public services, utilities, and service systems in the RD 784 area.

### **3.14.3 MITIGATION**

The following mitigation measure would be applied to the **Applicant Preferred Alternative – ASB Setback Levee Alternative and the Intermediate Setback Levee Alternative**.

#### **Mitigation Measure 3.14-a: Implement Measures to Ensure that Levee Setback Construction Does Not Adversely Affect Public Utility Infrastructure or Result in Service Interruption**

TRLIA, the design engineers, or the primary construction contractor for the levee setback, as appropriate, shall implement the following measures before the beginning of construction to ensure that the levee setback does not adversely affect public utility infrastructure or result in interruption of utility service:

- a. Coordinate with PG&E to protect electrical lines that cross the levee setback area. To maintain PG&E electrical service through the Bogue Loop 115-kV high-power transmission line and the two standard electrical lines that run along Ella Avenue and Country Club Avenue, TRLIA or its representative shall coordinate with PG&E to raise, relocate, or reinforce the steel towers and wood poles that stand in the proposed bypass area. This coordination is already underway for the Applicant Preferred Alternative – ASB Setback Levee Alternative.
- b. Ensure that all utility lines in the setback area have been identified and removed or reinforced as necessary. TRLIA or its representative shall ensure that any electrical, telephone, gas, and cable television lines within the levee setback area have been identified before the initiation of any ground-disturbing construction activity. Before the beginning of any construction related ground disturbance, TRLIA or its representative shall coordinate with all potential service providers known to have, or potentially having, utility infrastructure in the levee setback area, including but not limited to PG&E, AT&T, Comcast, OPUD, and RD 784, to ensure that the utility lines are removed or reinforced as appropriate.

The following mitigation measure would be applied to the **Applicant Preferred Alternative – ASB Setback Levee Alternative, Intermediate Setback Levee Alternative, and Levee Strengthening Alternative**.

#### **Mitigation Measure 3.14-b: Implement Measures to Reduce Hazards to Vehicles on Local Roadways**

Mitigation to address the potential for construction traffic to conflict with emergency response vehicles and increase response times would be the same as described in Section 3.13, “Transportation and Circulation,” Mitigation Measure 3.13-b: Implement Measures to Reduce Hazards to Vehicles on Local Roadways.



## **3.15 PALEONTOLOGICAL RESOURCES**

Paleontological resources (fossils) are the remains or traces of prehistoric animals and plants. This section assesses the potential for earthmoving activities associated with the proposed levee repairs to affect scientifically important fossil remains. The analysis addresses direct effects of the Applicant Preferred Alternative – Above Star Bend (ASB) Setback Levee Alternative (also referred to as the “Applicant Preferred Alternative”) and other alternatives. Indirect effects of the Applicant Preferred Alternative and other alternatives are addressed in Chapter 4.0, “Cumulative and Growth-Inducing Effects.” For example, potential impacts on as yet undiscovered paleontological resources resulting from development that could be facilitated by the Applicant Preferred Alternative and other action alternatives are discussed under Section 4.1.2.14, “Paleontological Resources.” For an evaluation of the combined effects on paleontological resources from implementation of past, present, and future projects in the region, see Section 4.2.4.11, “Paleontological Resources.”

### **3.15.1 EXISTING CONDITIONS**

The area considered for the Applicant Preferred Alternative – ASB Setback Levee Alternative and other alternatives is located in the Sacramento Valley. The Sacramento Valley and the San Joaquin Valley comprise the Great Valley of California, which is located between the Sierra Nevada on the east and the Coast Range mountains on the west.

Most of the surface of the Great Valley is covered with Recent (Holocene, i.e., 10,000 years B.P. to present day) and Pleistocene (i.e., 10,000–1,800,000 years B.P.) alluvium. This alluvium is composed of sediments from the Sierra Nevada to the east and the Coast Range to the west that were carried by water and deposited on the valley floor. Siltstone, claystone, and sandstone are the primary types of sedimentary deposits.

#### **3.15.1.1 HOLOCENE ALLUVIUM**

Sediments adjacent to the Feather River are composed of Recent (Holocene) alluvial floodplain deposits (see Figure 3.2-1, “Geologic Formations in the Project Area”). In general, these deposits consist primarily of unconsolidated sand and silt. Holocene alluvial deposits overlie an older alluvial fan system composed of Pleistocene-age sediments.

#### **3.15.1.2 PLEISTOCENE ALLUVIUM FORMATIONS, MODESTO FORMATION**

The Modesto formation is one type of Pleistocene age alluvium formation that occurs in the project area and is described briefly below.

In the Feather River Levee Repair Project (FRLRP) project vicinity, the Modesto Formation forms alluvial fans along the Feather River (Figure 3.2-1). Researchers differ as to the age of this formation: Marchand and Allwardt (1981) place the age between approximately 12,000 and 42,000 years B.P.; Atwater (1982) places the age from 9,000 to 73,000 years B.P.; and Helley and Harwood (1985) follow Marchand and Allwardt’s dating scheme. The Modesto Formation can be divided into an upper and lower member (i.e., distinct upper and lower levels), both of which occur in the project area. Age estimates for the lower member range from 42,000 to 73,000 years B.P. The upper member of the Modesto forms alluvial terraces that are topographically higher than those of the lower member. Age estimates for the upper member range from 12,000 to 26,000 years B.P.

### **3.15.2 ENVIRONMENTAL CONSEQUENCES**

#### **3.15.2.1 PALEONTOLOGICAL RESOURCE INVENTORY METHODS**

A stratigraphic inventory and paleontological resource inventory were completed to develop a baseline paleontological resource inventory of the project area and the vicinity by rock unit, and to assess the potential

paleontological productivity of each rock unit. Research methods included a review of published and unpublished literature and a cursory field survey. These tasks complied with Society of Vertebrate Paleontology (SVP) (1995) guidelines.

### **3.15.2.2 PALEONTOLOGICAL RESOURCE ASSESSMENT CRITERIA**

The potential paleontological importance of the project area can be assessed by identifying the paleontological importance of exposed rock units within the area. Because the areal distribution of a rock unit can be easily delineated on a topographic map, this method is conducive to delineating parts of the site that are of higher and lower sensitivity for paleontological resources and to delineating parts of the project area that may therefore require monitoring during construction.

A paleontologically important rock unit is one that (1) has a high potential paleontological productivity rating and (2) is known to have produced unique, scientifically important fossils. The potential paleontological productivity rating of a rock unit exposed at a project site refers to the abundance/densities of fossil specimens and/or previously recorded fossil sites in exposures of the unit in and near the site. Exposures of a specific rock unit at a project site are most likely to yield fossil remains representing particular species in quantities or densities similar to those previously recorded from the unit in and near the site.

A variety of factors are considered in determining whether an individual vertebrate fossil specimen may be considered unique or significant, including whether the fossil is:

- ▶ identifiable;
- ▶ complete;
- ▶ well preserved;
- ▶ age diagnostic;
- ▶ useful in paleoenvironmental reconstruction;
- ▶ a type specimen;
- ▶ a member of a rare species;
- ▶ a species that is part of a diverse assemblage; or
- ▶ a skeletal element different from, or a specimen more complete than, those now available for its species.

For example, identifiable vertebrate marine and terrestrial fossils are generally considered scientifically important because they are relatively rare. The value or importance of different fossil groups varies, depending on the age and depositional environment of the rock unit that contains the fossils, their rarity, the extent to which they have already been identified and documented, and the ability to recover similar materials under more controlled conditions such as part of a research project. Marine invertebrates are generally common, well developed, and well documented. They generally would not be considered a unique paleontological resource.

The following tasks were completed to establish the paleontological importance of each rock unit exposed at the project site:

- ▶ The potential paleontological productivity of each rock unit was assessed, based on the number of fossil remains previously documented within the rock unit.
- ▶ The potential for rock units exposed within the project site to contain unique paleontological resources was considered.

As discussed above, the analysis in this section addresses direct effects of the Applicant Preferred Alternative – ASB Setback Levee Alternative and other alternatives. Indirect effects of the Applicant Preferred Alternative and other alternatives are addressed in Chapter 4.0, “Cumulative and Growth-Inducing Effects.” The potential indirect effects to paleontological resources are evaluated in Section 4.1.2.14, “Paleontological Resources,” of the growth-inducement analysis and in Section 4.2.4.11, “Paleontological Resources,” of the cumulative impacts analysis.

### 3.15.2.3 RESOURCE INVENTORY RESULTS

#### Holocene Alluvium

Project-related activities that would occur within alluvial floodplain or basin deposits identified in Figure 3.2-1 would be located within Holocene (10,000 years B.P. and younger) sediments. Because, by definition, an object must be more than 10,000 years old to be considered a fossil, activities in these deposits would not have an impact on paleontological resources.

#### Modesto Formation

Remains of land mammals have been found at a number of localities in alluvial deposits referable to the Modesto Formation. Jefferson (1991a, 1991b) compiled a database of California Late Pleistocene vertebrate fossils from published records, technical reports, unpublished manuscripts, information from colleagues, and inspection of museum paleontological collections at more than 40 public and private institutions. Although Jefferson did not list any fossil sites in Yuba County, two nearby sites in Sutter County have yielded Rancholabrean vertebrate fossils recovered from Pleistocene-age sediments. The closest vertebrate fossil to the project site was recovered from an area across the Feather River approximately 3.5 miles west of the levee, near Yuba City (UCMP V-6426), in sediments referable to the Modesto Formation. University of California Museum of Paleontology (UCMP) locality V-3915 on Oswald Road, approximately 8 miles northwest of the project area, yielded vertebrate fossil remains in sediments referable to the Modesto Formation. Other locations are also known throughout the northern and Central Valley (University of California Museum of Paleontology 2006). For example, there are several sites approximately 20–30 miles away in Yolo and Sacramento Counties in or near the cities of Davis, Woodland, and Sacramento that have yielded numerous fossil remains from a variety of species.

Results of a paleontological records search at the UCMP indicated no fossil remains within the project area, and no fossils were observed during a cursory field visit. However, the occurrence of Pleistocene vertebrate fossil remains in sediments referable to the Modesto Formation from near Yuba City, and numerous other locations in the vicinity and region, suggests there is a potential for uncovering additional similar fossil remains in appropriate rock/soil types during construction-related earthmoving activities within the project area.

### 3.15.2.4 SIGNIFICANCE CRITERIA

A project alternative would have a significant impact on paleontological resources if it would directly or indirectly destroy a unique paleontological resource or site.

In its standard guidelines for assessment and mitigation of adverse impacts on paleontological resources, the SVP (1995) established three categories of sensitivity for paleontological resources—high, low, and undetermined:

**High sensitivity.** Areas where fossils have been previously found are considered to have a high sensitivity and a high potential to produce fossils. In areas of high sensitivity that are likely to yield unique paleontological resources, full-time monitoring is typically recommended during any project ground disturbance.

**Low sensitivity.** Areas that are not sedimentary in origin and that have not been known to produce fossils in the past typically are considered to have low sensitivity and monitoring is usually not needed during project construction.

**Undetermined sensitivity.** Areas or rock formations that have not had any previous paleontological resource surveys or fossil finds are considered undetermined until surveys and mapping are performed to determine their sensitivity. After reconnaissance surveys, observation of exposed cuts, and possibly subsurface testing, a qualified paleontologist can determine whether the area should be categorized as having a high or low sensitivity.

In keeping with the significance criteria of the SVP (1995), all vertebrate fossils are generally categorized as having potential significance based on their scientific value.

### **3.15.2.5 APPLICANT PREFERRED ALTERNATIVE – ASB SETBACK LEVEE ALTERNATIVE**

#### **AP Impact 3.15-a: Potential to Directly or Indirectly Destroy a Unique Paleontological Resource or Site**

Based on the records search conducted at the UCMP, there are no previously recorded fossil sites within the project area. The nearest recorded fossil site, UCMP V-6426, is located approximately 3.5 miles west of the project area. By definition, sediments associated with Holocene-age alluvium do not contain paleontologically sensitive resources; therefore, earthmoving activities for removal of the existing levee, occurring in the sediments contained within and adjacent to the existing levee, would result in no impacts on paleontological resources.

The northern portion of the proposed levee setback area in project Segment 2 is located entirely within sediments of the Modesto Formation, which is a paleontologically sensitive rock formation under SVP guidelines (Figure 3.2-1) (Society of Vertebrate Paleontology 1995, 1996). The remainder of the levee setback alignment is located on the border between the Modesto Formation and adjacent natural levee and channel deposits, with as much of the levee as possible on Modesto Formation sediments because they have better engineering characteristics for levee foundation construction. Piling of soil to form levees or berms on top of the existing ground surface would not adversely affect paleontological resources because Pleistocene-age fossils would not be encountered until approximately 10 feet below ground surface. However, excavations deeper than 10 feet (e.g., for the installation of slurry cutoff walls in the setback levee) have the potential to encounter and possibly damage paleontologically sensitive resources. Depending on the type of paleontological resource encountered and the level of damage, this could result in a significant adverse effect.

If the relocated Pump Station No. 3 were placed in an area underlain by the Modesto Formation rock unit, excavations associated with this facility could also have the potential to encounter and possibly damage paleontologically sensitive resources.

### **3.15.2.6 INTERMEDIATE SETBACK LEVEE ALTERNATIVE**

#### **ISL Impact 3.15-a: Potential to Directly or Indirectly Destroy a Unique Paleontological Resource or Site**

This alternative would match the alignment of the Applicant Preferred Alternative – ASB Setback Levee Alternative for approximately 1.6 miles in the south and then would follow an alignment approximately 1,000 feet (maximum) to the west of the Applicant Preferred Alternative – ASB Setback Levee Alternative setback levee alignment. The northern alignment for the Intermediate Setback Levee Alternative would be located on more Holocene Alluvium and less Modesto Formation than under the Applicant Preferred Alternative – ASB Setback Levee Alternative. Because the Modesto Formation is a more paleontologically sensitive formation, the Intermediate Setback Levee Alternative would have similar, but slightly less potential for adverse effects.

### **3.15.2.7 LEVEE STRENGTHENING ALTERNATIVE**

#### **LS Impact 3.15-a: Potential to Directly or Indirectly Destroy a Unique Paleontological Resource or Site**

The Levee Strengthening Alternative would require far less disturbance of land than under the Applicant Preferred Alternative – ASB Setback Levee Alternative. The majority of the ground-related construction activities associated with this alternative would be located within the existing levee easement, borrow sites, and areas associated with the relocation of Pump Station No. 3. Most of these activities would be located on Holocene

Alluvium deposits with no potential to contain significant paleontological resources. However, some potential does exist for an adverse effect, since some areas of project activity are located within the Modesto Formation, which is paleontologically sensitive.

### **3.15.2.8 NO-ACTION ALTERNATIVE**

If no permissions were granted to alter the existing levee or discharge dredged or fill material into waters of the United States, no construction work requiring deep ground disturbance would occur. Under these conditions, heavy underseepage and loss of foundation soils would be expected to continue and the threat of another levee failure in the Segment 2 project area would remain. Under the No-Action Alternative, it is possible that localized levee repairs (e.g., correction of identified waterside erosion sites) could be authorized under the federal Clean Water Act (CWA) Nationwide Permit (NWP) #3. This work would be unlikely to disturb or adversely affect paleontological resources.

### **3.15.3 MITIGATION**

The following mitigation measure would be applied to the **Applicant Preferred Alternative – ASB Setback Levee Alternative, Intermediate Setback Levee Alternative, and Levee Strengthening Alternative.**

#### **Mitigation Measure 3.15-a: Implement Measures for Identification and Protection of Paleontological Resources That Could Be Discovered on the Project Site during Earthwork**

TRLIA or its primary construction contractor shall implement the following measures:

- a. Before the start of construction activities, construction personnel involved with earthmoving activities shall be informed of the possibility of encountering fossils, the appearance and types of fossils likely to be seen during construction activities, and proper notification procedures should fossils be encountered. This worker training may either be prepared and presented by an experienced field archaeologist at the same time as construction worker education on cultural resources, or be prepared and presented separately by a qualified paleontologist.
- b. If paleontological resources are discovered during earthmoving activities, the construction crew shall immediately cease work within at least 25 feet of the find. TRLIA shall retain a qualified paleontologist to evaluate the resource and prepare a proposed mitigation plan in accordance with SVP guidelines (1995). The proposed mitigation plan may include a field survey, construction monitoring, sampling and data recovery procedures, museum storage coordination for any specimen recovered, and a report of findings. Recommendations determined by TRLIA to be necessary and feasible shall be implemented before construction activities can resume at the site where the paleontological resources were discovered.

## 3.16 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

Environmental justice is defined by the Environmental Protection Agency (EPA) Office of Environmental Justice as “the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.” Fair treatment means that “no group of people, including racial, ethnic, or socioeconomic group shall bear a disproportionate share of negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies.”

Executive Order (EO) 12898, Federal Actions to Address Environmental Justice in Minority and Low Income Populations (1994), includes the following agency responsibilities in regard to addressing environmental justice in minority and low-income populations:

To the greatest extent practicable and permitted by law, and consistent with the principles set forth in the report on the National Performance Review, each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and its territories and possessions, the District of Columbia, the Commonwealth of Puerto Rico, and the Commonwealth of the Mariana Islands. [Section 1-101]

This section addresses environmental justice issues related directly to the construction and operation of the Applicant Preferred Alternative – Above Star Bend (ASB) Setback Levee Alternative (also referred to as the “Applicant Preferred Alternative”) and other alternatives addressed in this EIS. Indirect effects of the Applicant Preferred Alternative and other alternatives, such as those associated with cumulative development in the RD 784 area, are addressed in Section 4.2.4.12 of Chapter 4.0, “Cumulative and Growth-Inducing Impacts.”

### 3.16.1 EXISTING CONDITIONS

All lands in the project area are in unincorporated Yuba County. The County has land use planning jurisdiction over privately owned land in this area. According to the 2000 U.S. Census Bureau Demographic Profile for Yuba County, the total population is 60,219. Within this total population 70.6% of individuals are reported as white/Caucasian, 17.4% are Hispanic and Latino, 7.5% are Asian, and 3.2% are black. Other ethnic groups make up the remaining 1.3% of the population. Approximately 4.6% of the population is employed within the farming, fishing, and forestry industries. Individuals below poverty level comprise 20.8% of the County’s population. Table 3.16-1 below outlines the specific income levels for households and families as identified in the 2000 U.S. Census Bureau Demographic Profile for Yuba County. Approximately 4.6% of the population is employed within the farming, fishing, and forestry industries.

Although the farming, fishing, and forestry industries make up a relatively small portion of the County’s employment, agriculture is considered among the most important contributors to the local economy (Yuba County 1994). As of 2006, approximately 228,113 acres of agricultural land existed in Yuba County (California Department of Conservation 2007). The major agricultural crops produced in the county are rice, plums, peaches, walnuts, kiwifruit, field crops, and almonds. Pastureland for grazing of beef and dairy cattle is also a major agricultural land use.

Yuba County’s urban centers are in the western portion of the County. The urbanized areas are the incorporated cities of Marysville and Wheatland and the unincorporated communities of Linda and Olivehurst. Within these urbanized areas are neighborhoods that would be considered low-income populations. Substantial development has also been completed in the Plumas Lake Specific Plan area, located in Reclamation District (RD) 784 west of State Route (SR) 70. Approximately 3,200 dwelling units, consisting primarily of single-family detached homes, have been constructed in this area.



**Table 3.16-1**  
**U.S. Census Bureau Income Levels for Yuba County Households and Families**

| Income in 1999                    | Number        | Percent      |
|-----------------------------------|---------------|--------------|
| <b>Households</b>                 | <b>20,552</b> | <b>100.0</b> |
| Less than \$10,000                | 2,810         | 13.7         |
| \$10,000 to \$14,999              | 1,784         | 8.7          |
| \$15,000 to \$24,999              | 3,694         | 18.0         |
| \$25,000 to \$34,999              | 3,360         | 16.3         |
| \$35,000 to \$49,999              | 3,747         | 18.2         |
| \$50,000 to \$74,999              | 2,943         | 14.3         |
| \$75,000 to \$99,999              | 1,260         | 6.1          |
| \$100,000 to \$149,999            | 614           | 3.0          |
| \$150,000 to \$199,999            | 167           | 0.8          |
| \$200,000 or more                 | 173           | 0.8          |
| Median household income (dollars) | 30,460        | (X)          |
| <b>Families</b>                   | <b>14,954</b> | <b>100.0</b> |
| Less than \$10,000                | 1,389         | 9.3          |
| \$10,000 to \$14,999              | 1,097         | 7.3          |
| \$15,000 to \$24,999              | 2,538         | 17.0         |
| \$25,000 to \$34,999              | 2,650         | 17.7         |
| \$35,000 to \$49,999              | 2,973         | 19.9         |
| \$50,000 to \$74,999              | 2,440         | 16.3         |
| \$75,000 to \$99,999              | 1,044         | 7.0          |
| \$100,000 to \$149,999            | 542           | 3.6          |
| \$150,000 to \$199,999            | 144           | 1.0          |
| \$200,000 or more                 | 137           | 0.9          |
| Median family income (dollars)    | 34,103        | (X)          |
| Source: US Census Bureau 2000     |               |              |

The existing Feather River levee in Feather River Levee Repair Project (FRLRP) Segment 2 is part of the federal-state Sacramento River Flood Control Project (SRFCP) within an easement obtained by the State of California through the Sacramento–San Joaquin Drainage District. The levee was constructed by the Corps and is maintained by RD 784 under the supervision of the Central Valley Flood Protection Board (CVFPB).

Remaining lands in the project area (e.g., setback levee alignment, setback area, soil borrow areas) are suited for agriculture, although parts of the area have suffered flood events that have resulted in crop damages (see Section 3.1, “Land Use and Agriculture,” for more details). Most of the land in the project vicinity is currently under cultivation, with the majority of the acreage planted in orchards. Some row crops are also planted. Several industrial facilities supporting agricultural operations are also located in the project vicinity, such as a produce packing plant, but these facilities are outside the project footprint.

Facility surveys have found approximately 20 structures located along Segment 2 between the Applicant Preferred Alternative – ASB Setback Levee Alternative levee alignment and the existing levee. Five of these structures are occupied residences, including one mobile home. Between the Intermediate Setback Levee Alignment and the existing levee are approximately 15 structures, three of which are residences, including one mobile home. The residences in the setback area consist of a mix of both owner-occupied and rental dwelling units, and do not constitute a low-income community. None of the residences are occupied by minority groups (Morrison, pers. comm., 2008). In the area protected from flooding by the Segment 2 levee, low-income residents occur in various locations just south of Olivehurst. Scattered individual residences and small enclaves of rural residences in the flood protected area would also be considered low-income residents.

### **3.16.2 ENVIRONMENTAL CONSEQUENCES**

#### **3.16.2.1 SIGNIFICANCE CRITERIA**

To prove a violation of federal environmental justice principles, the government must demonstrate that the proposed project or alternatives under consideration would cause impacts that are “disproportionately high and adverse,” directly, indirectly, or cumulatively. To make a finding that disproportionately high and adverse effects would likely fall on a minority or low-income population, three conditions must be met simultaneously: (1) there must be a minority or low-income population in the impact zone; (2) a high and adverse impact must exist; and (3) the impact must be disproportionately high and adverse on the minority or low-income population.

This section addresses environmental justice issues related directly to the construction and operation of the Applicant Preferred Alternative – Above Star Bend (ASB) Setback Levee Alternative (also referred to as the “Applicant Preferred Alternative”) and other alternatives addressed in this EIS. Indirect effects of the Applicant Preferred Alternative and other alternatives, such as those associated with cumulative development in the RD 784 area, are addressed in Section 4.2.4.12 of Chapter 4.0, “Cumulative and Growth-Inducing Impacts.”

#### **3.16.2.2 APPLICANT PREFERRED ALTERNATIVE – ASB SETBACK LEVEE ALTERNATIVE**

##### **AP Impact 3.16-a: Potential for Disproportionately High and Adverse Effects on a Minority or Low-income Population**

Under the Applicant Preferred Alternative – ASB Setback Levee Alternative, the area between the setback levee and the existing levee would become part of the Feather River floodplain and all existing buildings in this area would be removed as part of the project. Implementation of the Applicant Preferred Alternative would result in the removal of approximately 20 structures between the setback levee and the existing levee, five of which are residences. Homeowners and/or tenants in these residences would need to be relocated. However, these residences are not considered to constitute a low-income community and are not occupied by minority groups. In addition, all property acquisitions and relocations conducted as part of the project would be completed following both the Federal Uniform Relocation Act and the California Relocation Assistance Law and appropriate compensation would be negotiated with landowners displaced by the project. Eligible homeowners and renters/tenants would receive relocation assistance consistent with these federal and state statutes. Relocation of residences implemented as part of the Applicant Preferred Alternative would not result in a high and adverse socioeconomic impact, and any impact that did occur would not disproportionately affect a minority or low-income population.

Construction of the proposed setback levee under the Applicant Preferred Alternative would permanently convert approximately 250 acres of Important Farmland (e.g., Prime Farmland, Unique Farmland, Farmland of Statewide or Regional Importance) to a nonagricultural use (see discussion in Section 3.1, “Land Use and Agriculture”). Placement of a setback levee could also result in removal of additional land from agricultural production because some properties would be divided by the setback levee, which could make continued farming of some crops, or any farming on some parcels, impractical. Development of borrow areas outside the setback area would temporarily remove agricultural land from production until levee degradation takes place and the borrow areas are

returned to original grade. An exception is the Ella Road borrow area, where 18 acres of agricultural land would be permanently converted to a stormwater detention facility (see Section 3.1, “Land Use and Agriculture”). It is likely that some land in the setback area would be converted to habitat as mitigation for project impacts; however, the TRLIA board has adopted a policy to maintain as much of the setback area in agricultural use as is economically feasible and subject to ensuring public safety (see Appendix C). It is reasonable to assume that one-half or more of the roughly 1,045 acres of agricultural lands in the setback area would be retained in agricultural operations. Under these circumstances, up to approximately 525 acres of agricultural land in the setback area would be taken out of agricultural production and converted to habitat. Considering all potential mechanisms for removal of agricultural land from production, for the purposes of this analysis, it is assumed that implementation of the Applicant Preferred Alternative would permanently remove up to 800 acres of agricultural land from production.

Removal of approximately 800 acres of agricultural land from production could result in the loss of several agriculture-related jobs. However, farming is a major industry in Yuba County. Removal of 800 acres of agricultural land from production would affect less than 0.5% of the total agricultural land in the county. Agriculture would continue as a major economic sector in the county. Operators of the agricultural businesses would receive appropriate compensation for any temporary disturbance or permanent loss of agricultural lands associated with project implementation. In addition, all property acquisitions and relocations conducted as part of the project would be completed following both the Federal Uniform Relocation Act and the California Relocation Assistance Law. Eligible farm operations would receive relocation assistance consistent with these federal and state statutes. The Applicant Preferred Alternative would not result in a high and adverse socioeconomic impact related to the loss of agricultural jobs, and any impact that did occur would not disproportionately affect a minority or low-income population.

### **3.16.2.3 INTERMEDIATE SETBACK LEVEE ALTERNATIVE**

#### **ISL Impact 3.16-a: Potential for Disproportionately High and Adverse Effects on a Minority or Low-income Population**

Between the Intermediate Setback Levee Alignment and the existing levee there are approximately 15 structures, three of which are residences. Therefore, the Intermediate Setback Levee Alternative would result in the displacement of two fewer residences than under the Applicant Preferred Alternative – ASB Setback Levee Alternative, which would result in the displacement of five residences. In addition, the Intermediate Setback Levee Alternative would result in the conversion of less farmland than the Applicant Preferred Alternative, and would subsequently result in the loss of fewer agricultural-related jobs. Therefore, like the Applicant Preferred Alternative, implementation of the Intermediate Setback Levee Alternative would not result in a high and adverse socioeconomic impact, and any impact that did occur would not disproportionately affect a minority or low-income population.

### **3.16.2.4 LEVEE STRENGTHENING ALTERNATIVE**

#### **LS Impact 3.16-a: Potential for Disproportionately High and Adverse Effects on a Minority or Low-income Population**

Under the Levee Strengthening Alternative, no residences would be removed from the levee setback area and consequently no occupants would be displaced. Implementation of this alternative would result in the removal of up to approximately 25 acres agricultural land from production to allow the installation of seepage stability berms and replacement of Pump Station No. 3. However, with over 230,000 acres of agricultural land in the County, the removal of 25 acres from production would not result in substantial loss of agricultural jobs. Implementation of the Levee Strengthening Alternative would not result a in high and adverse socioeconomic impact, and any impact that did occur would not disproportionately affect a minority or low-income population.

### **3.16.2.5 NO-ACTION ALTERNATIVE**

If no permissions were granted to alter the existing levee or discharge dredged or fill material into waters of the U.S., it is unlikely that any residences would be removed from the levee setback area and consequently no occupants would be displaced. It is also very unlikely that any agricultural lands would be converted to another use (e.g., levee, habitat); therefore, no loss of agricultural jobs in the vicinity would occur. Under these conditions, heavy underseepage and loss of foundation soils would be expected to continue and the threat of another levee failure in the Segment 2 project area would remain. Under the No-Action Alternative, it is possible that minor levee repairs (e.g., correction of identified waterside erosion sites) could be authorized under the federal Clean Water Act (CWA) Nationwide Permit (NWP) #3. This work would not cause any adverse socioeconomic effects.

In the event of a levee breach, the temporary and permanent displacement of residents would occur over a wide area. In addition, a levee breach could render a considerable portion of the county's agricultural land temporarily incapacitated, which could result in short-term loss of agricultural related jobs. This displacement of residents and loss of jobs resulting from a levee breach would be considered a high and adverse socioeconomic impact. However, this impact would occur across a wide range of income and ethnic classifications, ranging from low-income residents in areas just south of Olivehurst, to owners of single-family residences in the Plumas Lake Specific Plan area, to landowners with large agricultural landholdings. Therefore, the impact would not be disproportionately high or adverse for a minority or low-income population. Therefore, although the No-Action Alternative could result in a significant adverse socioeconomic effect through maintenance of an increased flood risk to the RD 784 area and potential for a levee breach during the period before the Corps and/or the State of California are able to implement levee improvements, this adverse socioeconomic effect would not be considered a significant adverse affect on environmental justice.

### **3.16.3 MITIGATION**

Under the Applicant Preferred Alternative – ASB Setback Levee Alternative and other alternatives there are no significant adverse effects related to socioeconomics and environmental justice and no mitigation is required.

## **4.0 CUMULATIVE AND GROWTH-INDUCING EFFECTS**

### **4.1 GROWTH-INDUCING EFFECTS**

Projects are considered to induce growth when they could foster economic or population growth. Inclusion of housing in a project and generation of a substantial number of new jobs resulting from project implementation are the most typical mechanisms for a project to induce growth. In some instances, removing an obstacle to growth can also be considered a growth-inducing effect. For example, a major expansion of a wastewater treatment plant may allow for development of new and additional housing and jobs generating land uses in the plant's service area. In this example, under the existing conditions, limited wastewater treatment capacity acts as an obstacle to additional growth in the treatment plant's service area. Altering the existing condition in this example, by expanding the plant's treatment capacity, removes this obstacle to growth. Similarly, where flood risk may be seen as an obstacle to growth within an area, levee improvements that would reduce that risk may be considered to remove an obstacle to growth and thereby be indirectly growth inducing.

Growth inducement itself is not an environmental effect, but may foreseeably lead to environmental effects. These environmental effects may include increased demand for utilities and public services, increased traffic and noise, degradation of air or water quality, degradation or loss of plant or animal habitats, or conversion of agricultural and open space land to urban uses. Growth within a floodplain area may increase the risk to people or property from flooding.

#### **4.1.1 FOSTERING ECONOMIC GROWTH**

The Applicant Preferred Alternative – Above Star Bend (ASB) Setback Levee Alternative (also referred to as the “Applicant Preferred Alternative”) and other alternatives would not directly foster economic or population growth because they consist only of construction of levee improvements. No housing is included in the Applicant Preferred Alternative or other alternatives that could generate population growth. The construction labor force for the Applicant Preferred Alternative and other action alternatives would typically average between 50 and 70 individuals depending on the alternative, with peak staffing reaching as many as 100 persons depending on the contractor's schedule (see Chapter 2.0, “Alternatives”). Because the construction would be limited to a specific short-term timeframe, it is not expected to result in new, permanent employment. The existing construction labor pool in Yuba County and nearby areas (e.g., Yuba City, Sacramento) would be sufficient to meet the demand for the temporary construction workers that would be generated by the Applicant Preferred Alternative or other action alternatives. Because construction workers serving the Applicant Preferred Alternative and other action alternatives can be expected to come from the nearby communities, substantial population growth or increases in housing demand in the region as a result of these jobs is not anticipated. Furthermore, even if some construction workers from outside the region were employed at the project site, construction workers typically do not change residences when assigned to a new construction site and substantial permanent relocation of these workers to the area is not anticipated. Therefore, the Applicant Preferred Alternative and other action alternatives would not directly foster economic or population growth through construction of housing, generation of a substantial number of new jobs, or increased demand for housing. Consequently, the Applicant Preferred Alternative and other alternatives would not result in environmental effects resulting from the direct fostering of economic or population growth.

#### **4.1.2 REMOVING OBSTACLES TO GROWTH—FLOOD PROTECTION**

##### **4.1.2.1 OVERVIEW OF FLOOD PROTECTION EFFORTS AND PLANNED DEVELOPMENT IN THE RECLAMATION DISTRICT 784 AREA**

As described in Section 1.7, “Need for Improved Flood Protection,” flooding that occurred in the Central Valley in 1986 resulted in initiation of various flood control studies and projects in the Yuba River basin and in the

Reclamation District (RD) 784 area of Yuba County. The System Evaluation project conducted by the U.S. Army Corps of Engineers (Corps) and the California Department of Water Resources (DWR) was the first of these flood control projects. This project was followed in 1988 by the initiation of the Yuba Basin Project.

In 1993, following the initiation of the System Evaluation and the Yuba Basin Project and before the floods of 1997, Yuba County (County) had approved the Plumas Lake Specific Plan, which provides for a 12,000-home development on 5,300 acres in the southern portion of the RD 784 area (see Figure 4-1). The Plumas Lake Specific Plan area is within the area that would be inundated if the Feather River Levee Repair Project (FRLRP) Segment 2 levee (the levee segment addressed by the Applicant Preferred Alternative – ASB Setback Levee Alternative and other alternatives) were to breach during a 100-year flood event (Figure 4-2). Construction of the Plumas Lake development began in 2002. However, the results of a Corps floodplain mapping study completed in 2003 indicated that the people and property in the RD 784 area, including homes that had already been built in the Plumas Lake Specific Plan area before the release of the Corps study, are subject to a much higher flood risk than was previously believed. Without levee improvements that meet Federal Emergency Management Agency (FEMA) criteria, new Flood Insurance Rate Maps that will be issued by FEMA for the RD 784 area would designate the area as being within the 100-year floodplain.

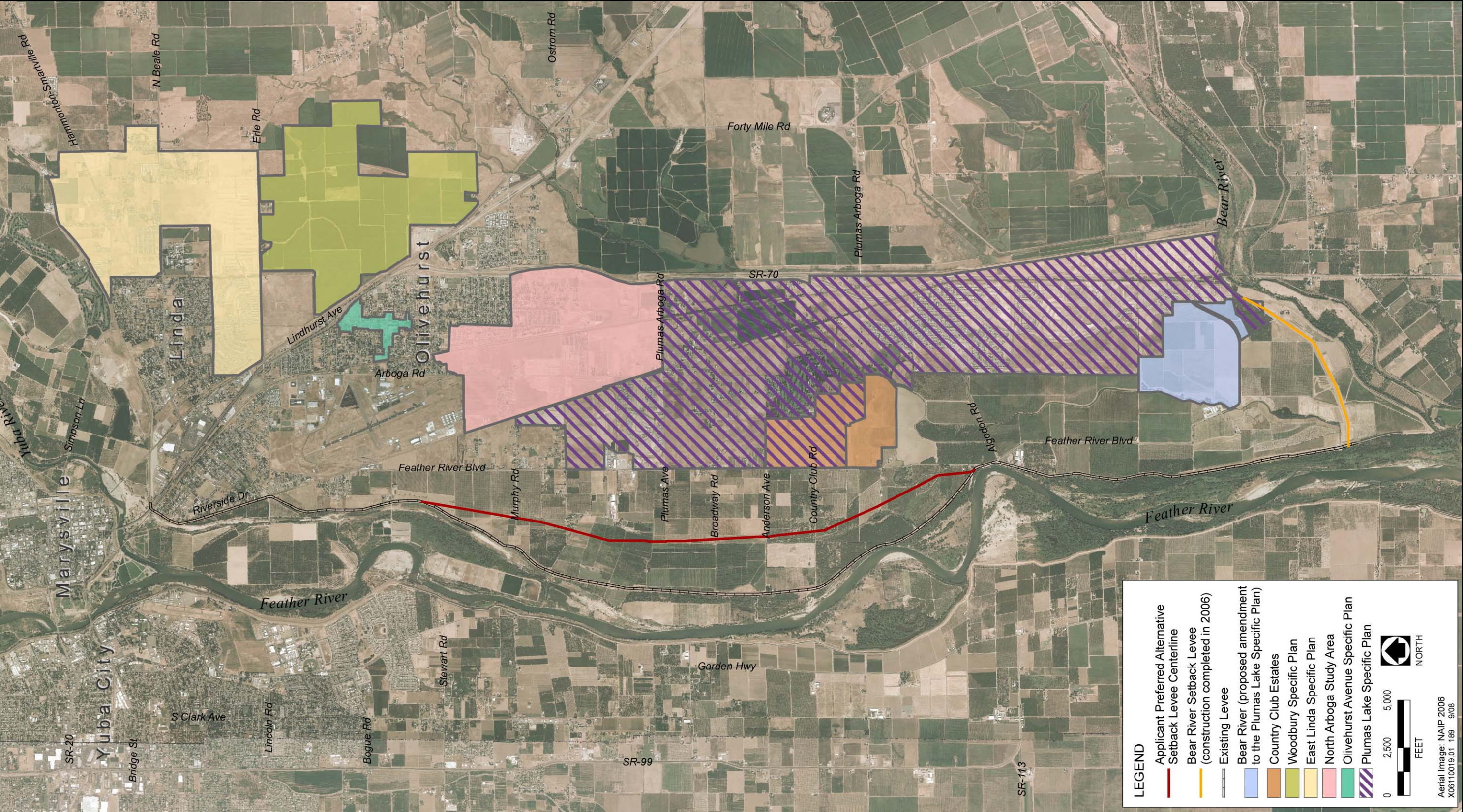
To avoid having RD 784 mapped into the FEMA 100-year floodplain, Yuba County Water Agency (YCWA), RD 784, and the County, in consultation with many landowners and developers in the south county, elected to move aggressively on a program for achieving FEMA certification of the RD 784 levees. As a result of this program, various levee repair/improvement projects and other flood protection projects have been completed, are under way, or are being studied in the RD 784 area, including the FRLRP (See Section 1.8 in Chapter 1.0).

In 2005, the State of California Reclamation Board (The Reclamation Board, subsequently renamed the Central Valley Flood Protection Board [CVFPB]) issued an encroachment permit for work on Phase 2 of the flood control program being implemented by Three Rivers Levee Improvement Authority (TRLIA), which included Bear River and Western Pacific Interceptor Canal (WPIC) levee improvements and construction of the Olivehurst detention basin. Notably, the encroachment permit contained a special condition that limited the issuance of building permits in the RD 784 area to 800 in 2005 and 700 in 2006. Limitations on building permits would be removed after planned flood protection projects were completed. This condition in the CVFPB's encroachment permit, which was agreed to by the County, provided a nexus between completion of flood protection efforts and future growth/development in the RD 784 area.

Since 2005, remaining state bond funding for TRLIA's levee improvements under the Costa-Machado Water Act of 2000 has been expended. The lack of available funding has constrained TRLIA's ability to continue planned flood protection improvements, including implementation of the FRLRP (a portion of which is the subject of this EIS) as well as additional levee repair work on the Yuba River left (south) bank levee. These circumstances contributed to the April 21 and May 19, 2006, decisions by the CVFPB to approve a resolution allowing TRLIA to accelerate its levee improvement program using developer-generated funding. The resolution allowed developers to generate these funds by removing the previous CVFPB limitation on building permits (800 in 2005 and 700 in 2006). The CVFPB found that the building permit limitation in the Plumas Lake Specific Plan area was, indeed, limiting TRLIA's ability to continue necessary levee improvement and construction projects. Therefore, development was allowed to proceed in the specific plan area without the previous constraints.

However, even with the CVFPB's removal of restrictions on building permits in the RD 784 area, the lack of adequate flood protection continues to provide an obstacle to planned growth. CVFPB's April 2006 resolution includes various conditions that must be met to allow continued development, to which all parties agreed. TRLIA made a commitment to use its best efforts to complete all elements of the flood control program by 2008. The developers were required to purchase flood insurance for homeowners in the Plumas Lake Specific Plan developments until 2008, or until completion of necessary flood protection efforts. Furthermore, the County agreed to satisfy concerns expressed by the CVFPB regarding the status of its Flood Safety Information



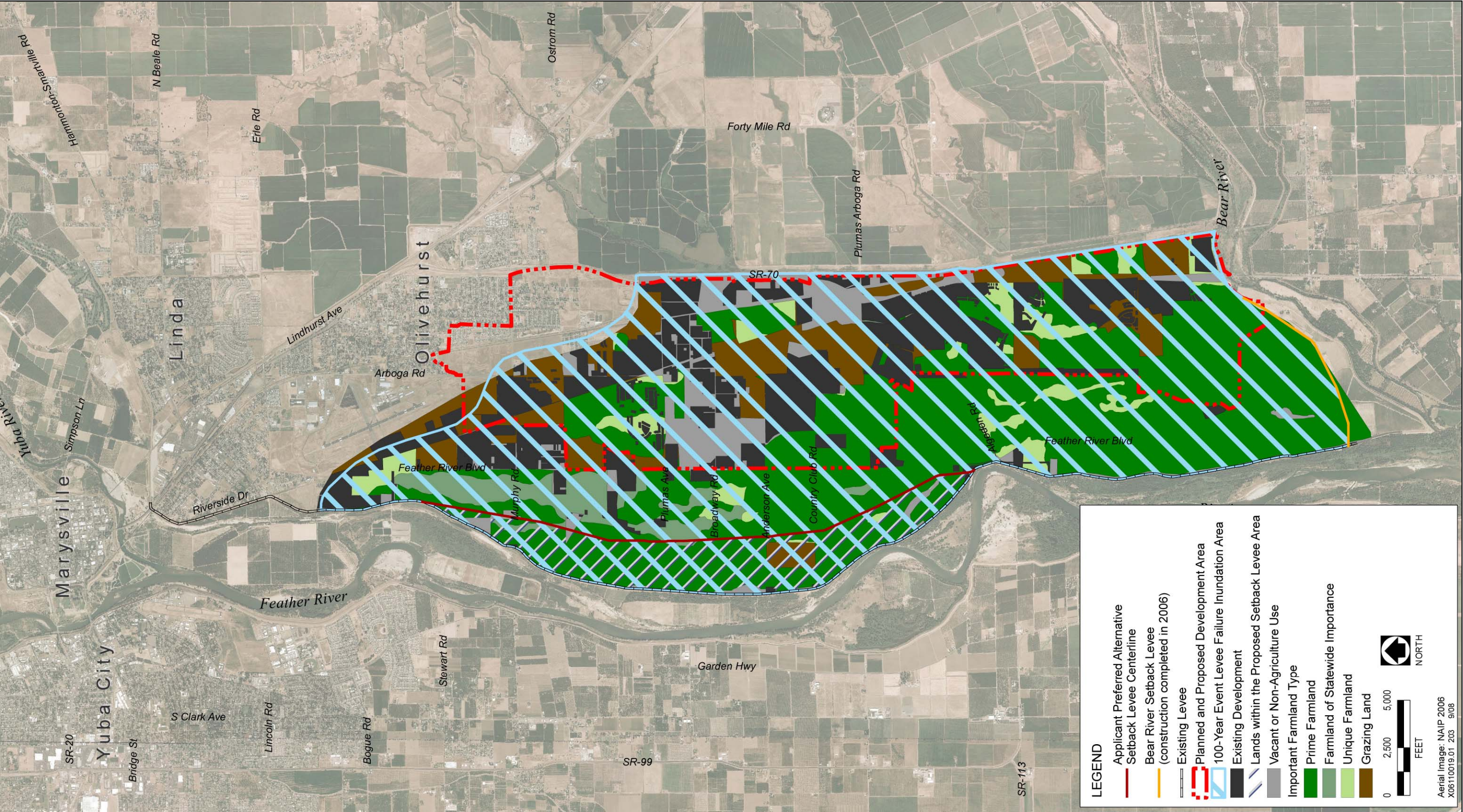


Source: Yuba County 2007

Current and Planned Development Projects in South Yuba County

Figure 4-1





Source: California Department of Conservation 2006; Yuba County 1996a; land use parcel data provided by Yuba County in 2007; Three Rivers Levee Improvement Authority 2008

Important Farmland, Existing and Planned Development within the 100-Year Event Levee Failure Inundation Area

Figure 4-2



and Emergency Evacuation Plan. Requirements that developers purchase flood insurance for homeowners, and the simple fact that development in the RD 784 area would not have 100-year flood protection, significantly limits the implementation of planned development.

As described above, the Plumas Lake Specific Plan was approved in 1993. Construction of the first homes in the developments began in spring 2003. Given the circumstances described above, continuing buildout of the Plumas Lake Specific Plan area is directly linked to continuing levee improvements that are proposed for Segment 2 under the FRLRP. Based on the conditions of the CVFPB's April 2006 resolution, to which the involved parties agreed, without implementation of the FRLRP Segment 2 work, development in the Plumas Lake Specific Plan area could not proceed beyond 2008. Other development plans in the RD 784 area protected by the FRLRP Segment 2 levee are also linked to completion of levee improvements. As shown in Figures 4-1 and 4-2, the proposed Bear River amendment to the Plumas Lake Specific Plan, the Country Club Estates project, and portions of the North Arboga Study Area would all be inundated if the Segment 2 levee were to breach during a 100-year flood event. Improvements to the FRLRP Segment 2 levee would be considered removal of an obstacle to implementation of these development plans. Therefore, because it would remove an obstacle to future development, implementation of the FRLRP Segment 2 levee repairs may be considered growth inducing. It should be noted that other developments shown in Figure 4-1 would not be provided flood protection by repair of the FRLRP Segment 2 levee (i.e., East Linda Specific Plan, Woodbury Specific Plan, Olivehurst Avenue Specific Plan) and their development is therefore not linked directly to FRLRP implementation. However, these projects are considered in the evaluation of cumulative impacts discussed below in Section 4.2, "Cumulative Effects."

The development supported by completion of the TRLIA program of flood control improvements, including the FRLRP Segment 2 work, is consistent with existing land use and project plans in the RD 784 area that were approved before the need for the proposed levee improvements had become apparent. Development in these areas is proceeding in accordance with the applicable plans, which include the Yuba County General Plan (Yuba County 1994a, 1996a), Plumas Lake Specific Plan (Yuba County 1992a), and North Arboga Study Area Plan (Yuba County 1992d).

As described above, the Yuba County General plan provides for continued growth and development in the RD 784 part of the county. This future growth was planned with the assumption that the area will have adequate flood protection. The Yuba County General Plan was adopted in 1994 and readopted with amendments in 1996, before the Corps' determination in 2003 that the flood hazard risk in RD 784 was much higher than previously believed. The General Plan incorporated those development projects in the RD 784 area that had been previously approved by the County, including the Plumas Lake Specific Plan and the North Arboga Study Area Plan. Construction of homes in some of the previously approved development plans, including the Plumas Lake Specific Plan, began prior to 2003. Without levee improvements, the RD 784 area would be designated as being within the 100-year floodplain and development according to the Yuba County General Plan would not be able to proceed.

The Yuba County General Plan projected a population of 95,000 at full buildout throughout Yuba County by 2015. The general plan includes the Plumas Lake Specific Plan and other development plans in the RD 784 area. The Plumas Lake Specific Plan entails a mixed-use development on approximately 5,300 acres east of the FRLRP project area. To date, primarily residential land uses have been developed in the plan area, with approximately 3,200 of the approximately 12,000 planned homes being built. There are also three elementary schools, a fire station, and a small amount of retail development in the Plumas Lakes area. The North Arboga Study Area Plan consists of approximately 1,300 acres and would provide for approximately 2,500 dwelling units, 205 acres of industrial use, and 10–20 acres of commercial use.

Environmental analyses have been completed for these plans pursuant to the California Environmental Quality Act (CEQA). These analyses disclose the environmental effects associated with their implementation and describe mitigation measures adopted to eliminate or reduce the severity of environmental effects. Applicable CEQA analyses include the draft and final environmental impact reports (EIRs) for the Yuba County General Plan

(Yuba County 1994b, 1996b); Plumas Lake Specific Plan (Yuba County 1992b, 1993); and North Arboga Study Area Plan (Yuba County 1992c, 1992d).

CEQA analyses are underway for two additional large-scale mixed-use projects within the area protected by the FRLRP Segment 2 levee (see Figures 4-1 and 4-2). The Bear River development project involves an amendment to the Plumas Lakes Specific Plan with 2,123 proposed dwelling units and 31 acres of commercial and business professional land. The DEIR for the Bear River development project (Yuba County 2008b) has been released for public review. In addition, a DEIR was issued for the Country Club Estates Master Planned Community Project (Yuba County 2008c), which proposes 1,135 residential units on 577 acres, partially contained within the Plumas Lake Specific Plan area.

Implementation of the FRLRP Segment 2 levee repairs would remove an obstacle to the buildout of these plans but would not alter the location or amount of growth and development envisioned in the plans and described in the respective EIRs. Effects on the environment resulting from the FRLRP's Segment 2 levee repairs removal of an obstacle to planned growth in the RD 784 area are identified in the above-listed documents. Therefore, the available documents were used as the main source of information about the likely environmental effects of growth in the area protected by the FRLRP Segment 2 levee. Significant impacts identified in these documents are summarized below.

In addition to the above-listed development projects, the potential exists for additional new development to be induced as a result of improved levels of flood protection in areas not currently planned by the County for urbanization. The area susceptible to this growth inducement mechanism would be that portion of RD 784 that is currently at risk for flooding due to a break in the FRLRP Segment 2 levee, but is not currently developed or proposed for development. Figure 4-2 shows the extent of inundation that would occur in RD 784 from a levee failure in FRLRP Segment 2 during a 100-year flood event. Table 4-1 shows the estimated area of Important Farmland that would potentially be susceptible to development pressure under the Applicant Preferred Alternative – ASB Setback Levee Alternative, over and above the acreage already planned or proposed for development.

| <b>Table 4-1</b><br><b>Total Land Acreage and Important Farmland Acreage in the FRLRP Segment 2 Levee Breach Inundation Area Under the Applicant Preferred Alternative – ASB Setback Levee Alternative</b> |                                 |                                        |                                        |               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|----------------------------------------|----------------------------------------|---------------|
| Scenario                                                                                                                                                                                                   | Setback Levee Footprint (acres) | Land Area within Setback Levee (acres) | Land Area East of Setback area (acres) | Total (acres) |
| Land Area within Inundation Area                                                                                                                                                                           | 300                             | 1,300                                  | 11,800                                 | 13,400        |
| Important Farmland Currently Existing within Inundation Area                                                                                                                                               | 260                             | 1,045                                  | 6,040                                  | 7,345         |
| Important Farmland Remaining with Buildout of Current Planned Development                                                                                                                                  | 260                             | 1,045                                  | 4,790                                  | 5,835         |
| Important Farmland Susceptible to Growth Inducing Effects                                                                                                                                                  | NA                              | NA                                     | 4,790                                  | 4,790         |

As shown in Table 4-1, the total inundation area shown in Figure 4-2 is approximately 13,400 acres. Under the Applicant Preferred Alternative, approximately 300 acres of this area would be covered by the new setback levee footprint, and approximately 1,300 acres would be placed in the expanded Feather River floodway. The land placed in the floodway would be considered undevelopable and shielded from development pressure. Of the 11,800 acres to the east of the proposed setback levee alignment and in the inundation area, approximately 6,040 acres is currently undeveloped and supports important farmland. The remaining roughly 5,760 acres is either currently developed, highly disturbed and cannot be cultivated (e.g., grading and compaction completed and

underground utilities installed in the Plumas Lake Specific Plan Area but no structures in place), or otherwise in a disturbed or vacant state not suitable for agricultural use. The type and extent of existing land uses is based on geographic information system (GIS) land use data provided by Yuba County. Of the roughly 6,040 acres of existing Important Farmland in the inundation area and east of the proposed setback levee alignment, approximately 1,250 acres is included in current planned development areas (i.e., Plumas Lake Specific Plan Area, Bear River amendment area, Country Club Estates area, North Arboga Study Area). This leaves approximately 4,790 acres of Important Farmland that would be exposed to new development pressures by the removal of flood protection as an impediment to growth. This total would be approximately 200 acres greater (4,990 acres) under the Intermediate Setback Levee Alternative because less land would be protected from development pressure in the expanded floodway. The total would be approximately 1,305 acres greater (6,095 acres) under the Levee Strengthening Alternative because no land would be placed under a setback levee footprint or in an expanded floodway and all Important Farmland in the inundation area to the east of the existing levee alignment would receive increased flood protection.

The degree to which the additional flood protection provided by the FRLRP Segment 2 work would alter future development patterns or result in increased development in areas afforded greater flood protection would be subject to the discretion of the Yuba County Board of Supervisors, based on applicable environmental review and planning studies. Detailed evaluation of these potential environmental effects would be speculative at this time.

#### **4.1.2.2 LAND USE AND AGRICULTURE**

The EIR for the Yuba County General Plan found no significant impacts related to land use as a result of project implementation. The general plan did anticipate the conversion of agricultural land to developed uses in the Plumas Lake Specific Plan area, and in other areas directed development away from agricultural land classified as Prime Farmland and to infill areas to prevent agricultural land fragmentation. The Bear River development project requires a General Plan amendment, as well as amendments to the Plumas Lake Specific Plan and changes to the County Zoning Ordinance. The DEIR found the proposed project to be inconsistent with Yuba County General Plan policies that call for avoiding conversion of prime farmland for urban uses and the placement of residential uses adjacent to agricultural uses. The County Club Estates Project would require a General Plan amendment, as well as amendments to the Plumas Lake Specific Plan, and change in zoning.

The Plumas Lake Specific Plan EIR reported that buildout of the specific plan would result in the significant and unavoidable impact to important farmland due to the conversion of 5,000 acres of agricultural land to nonagricultural uses. Inconsistency of the specific plan with Policy 1a of the Agricultural Lands section of the Land Use Element of the Yuba County General Plan was found to be a significant and unavoidable impact in the EIR. The EIR also found that buildout of the specific plan would endanger the viability of agricultural lands adjacent to the plan area boundaries because of land use conflicts between urban and agricultural uses. Mitigation measures were provided, but the impact was still identified as significant and unavoidable. The EIR also found that public health impacts related to land use conflicts could potentially arise from agricultural aerial spraying in lands adjacent to the plan area. A mitigation measure, requiring a 300-foot-wide buffer zone between the plan area and adjacent agriculture was provided, but the impact was still considered potentially significant. Potential impacts on public health and safety where residential areas would be adjacent to the All Pure Chemical plant were also considered significant and unavoidable, although mitigation was provided in the form of an early warning system and evacuation plan for nearby residences. Other potential impacts from residential land uses abutting commercial, industrial, and infrastructure land uses were considered to be reduced to a less-than-significant level by mitigation.

The North Arboga Study Area EIR identified the loss of approximately 600 acres of non-Prime Farmland as a significant cumulative impact. Other significant land use effects identified in the EIR include conflicts between residential and agricultural land uses, conflicts between some study area land uses and nearby airport zone restrictions, proximity of some land uses to high-voltage power lines, and potential odor effects at residential uses. Only the loss of non-Prime Farmland was considered a significant and unavoidable impact after mitigation.

The DEIR for the Bear River development project identified the conversion of 550 acres of prime farmland to urban uses as a significant and unavoidable impact. The Country Club Estates Project would convert an additional 218 acres of Prime Farmland to nonagricultural uses. The DEIR for the Country Club Estates project found this to be a significant and unavoidable impact.

As described above in the discussion related to Table 4-1 and shown in Figure 4-2, portions of the agricultural land conversions attributed to the Plumas Lake Specific Plan and North Arboga Study Area have already occurred, based on existing land use data provided by Yuba County. Continued implementation of the Plumas Lake Specific Plan, North Arboga Study Area project, Country Club Estates project, and the Bear River Amendment, facilitated by the removal of flood protection as an impediment to growth, would result in conversion of an additional roughly 1,250 acres of Important Farmland to development. As noted above, as much as 4,790 to 6,095 acres of Important Farmland (depending on the project alternative) not currently proposed or planned for development would also be at risk from growth pressure if repairs to the Segment 2 levee were in place.

#### **4.1.2.3 POPULATION AND HOUSING**

The EIRs for the Yuba County General Plan and the Plumas Lake Specific Plan found no significant impacts related to housing and population that would arise from project implementation. The North Arboga Study Area EIR did not address population and housing. In the context of growth inducing impacts, however, the EIR stated that jobs will be created over the long term for provision of goods and services to approximately 7,000 to 8,000 new residents, and particularly if the industrial lands are developed with manufacturing and related uses.

The Bear River project DEIR noted significant and unavoidable impacts related to population growth induced by the project's residential development. The potential for job availability in the region not to keep pace with population would result in additional impacts related to longer commutes in the region. This was considered a significant and unavoidable impact.

The DEIR for the Country Club Estates Project identified no impacts associated with population and housing.

#### **4.1.2.4 GEOLOGY, SOILS, AND MINERAL RESOURCES**

The EIRs for the Yuba County General Plan and Plumas Lake Specific Plan did not identify any significant impacts related to geology, soils, and mineral resources. The North Arboga Study Area EIR introduced three mitigation measures to address potentially significant effects related to seismic safety, expansive soil, and erosion, and concluded that these mitigation measures would reduce impacts to less-than-significant levels.

The Bear River project DEIR noted potential impacts due to seismic activity and from soil erosion caused by soil disturbance. Mitigation measures, consisting of compliance with grading plans and putting erosion control measures in place on the site, were provided to reduce these impacts to less-than-significant levels.

The DEIR for the Country Club Estates project identified significant impacts associated with exposure of new development on the site to unstable soil conditions. Mitigation measures, including compliance with recommendations of the geotechnical engineering report prior to site development would reduce impacts to a less than significant level. The DEIR found that adherence to State and local regulations would avoid impacts related to soil erosion.

#### **4.1.2.5 HYDROLOGY, WATER SUPPLY AND QUALITY, AND DRAINAGE**

##### **Flood Risk**

Environmental analysis generally considers only the risk of placing people and property within a 100-year floodplain. Because deficiencies in the levee system protecting the RD 784 area were assumed to have been corrected and a 100-year level of protection was assumed to exist there at the time that major development plans for the area were approved, the EIRs for the Plumas Lake Specific Plan, North Arboga Study Area and Yuba County General Plan did not identify flood risk as a major issue of concern. The Plumas Lake Specific Plan EIR did identify public safety hazards potentially created by floodplain development and included a mitigation requirement for the design of 100-year flood protection consisting of storage capacity to contain the development's storm water runoff from a 100-year, 24 hour event. The EIR concluded that this measure would reduce the impact to a less-than-significant level. The DEIRs for the Bear River Specific Plan and the Country Club Estates project noted significant impacts from development of housing within a designated flood hazard area and the exposure of people to the risk of flooding due to levee failure. Mitigation measures identified for the Country Club Estates project require Yuba County to limit development in the area until levee repairs are completed and a planned pump station is operational. The mitigation measure in the Bear River Specific Plan DEIR requires that finished floors of structures be placed above the 100-year, 24-hour flood elevation. The DEIRs result in the conclusions that these measures would reduce impacts to less-than-significant levels.

TRLIA anticipates that completion of its overall flood protection program, including the FRLRP, would provide the RD 784 area with a 200-year level of flood protection. The TRLIA program is intended to increase the level of flood protection for an already urbanized area that has a substantial risk of flooding. It would reduce the probability of flooding of the RD 784 area from a 1:20 annual exceedance probability (AEP) (5% chance) to a 1:200 AEP (0.5% chance). Once the higher level of protection is achieved and development proceeds, however, more people and property could be placed at risk in the event of a very extreme flood event. This portion of the flood risk that still exists following implementation of a flood damage reduction project is referred to in flood control literature as "residual risk." The residual risk in the RD 784 area following completion of the TRLIA program would be somewhat exacerbated by an increase in population and damageable property associated with the completion of buildout of the plan areas.

TRLIA and Yuba County, recognizing that risk will remain following completion of the levee improvements, are working to mitigate these risks by reevaluating and updating the Yuba County emergency operations plan and educating existing and new residents of flood risks and evacuation plans for flood events. The Yuba County Office of Emergency Services provides information on its existing early warning system, including the Wide Area Rapid Notification System (WARN), which has the ability to send out a pre-recorded emergency message to thousands of telephone numbers per minute. Local radio and television stations would also provide instructions in the event of a major emergency. Emergency instructions include information such as evacuation preparations and precautions such as where sand bags may be available (Yuba County Emergency Services 2007).

##### **Water Supply, Water Quality, and Drainage**

The Plumas Lake Specific Plan EIR discussed how development of the plan area would increase demands for water and could potentially cause water quality to decline, but provided mitigation to reduce these effects to a less-than-significant level. Mitigation measures included identification, dedication and construction of approximately 21 new wells to provide adequate groundwater to serve the development, water treatment, if needed, to meet State and federal Environmental Protection Agency (EPA) water quality standards, and integration of the domestic water distribution system with the Olivehurst Public Utilities District (OPUD) system. As is typically the case for new development in a currently undeveloped area, although there may not be sufficient utility infrastructure to serve the project prior to development beginning, the project itself includes installation of sufficient infrastructure to meet project demands.



California State Water Code provisions (California Senate Bill 610), which became effective in 2002, require that detailed water availability information be provided to city and county decision-makers prior to local approval of specified large development projects. As a consequence, in June 2007, a Water Supply Assessment (WSA), consistent with the requirements of Senate Bill 610, was completed for the proposed Country Club Estates project, which lies primarily within the Plumas Lake Specific Plan area. In accordance with State law, the WSA evaluated whether the local water provider has sufficient supply available to support existing and planned growth in their service area, looking at present conditions as well as 20 years into the future, during normal, dry, and multiple dry years. The WSA found that the Olivehurst Public Utilities District (OPUD) currently has sufficient water supplies, and will continue to have sufficient water supplies 20 years into the future, to provide for existing and planned development within the OPUD service area, including the Plumas Lake Specific Plan and Country Club Estates projects, and the other proposed developments (Olivehurst Public Utilities District 2007). The specific plans listed in the WSA included the Plumas Lake Specific Plan (almost 12,000 units), the East Linda Specific Plan (just over 6,000 units), and the Wilson Ranch Specific Plan (approximately 4,000 units).

Specifically, groundwater monitoring in Yuba County shows stable groundwater levels indicating no significant reductions in groundwater levels during dry periods, and OPUD is therefore anticipated to have sufficient water supplies during all water-year types. Preliminary data from the pending Yuba County Integrated Regional Water Management Plan also projects a net decrease in groundwater demand for the basin of 28,100 acre-feet per year within the next 10 to 20 years, or 18% of current withdrawal from the whole Yuba Groundwater Basin.

The Plumas Lake Specific Plan EIR identified no other significant impacts related to water supply, water quality, or drainage as a result of project implementation.

Groundwater wells capable of providing 2,400 AFA are proposed to serve the Country Club Estates project, enough to satisfy a projected demand of 1,600 AFA. The wells would draw from a lower aquifer than is currently being used for existing groundwater pumping and the characteristics of the lower aquifer are not well known. The DEIR concludes that there will be adequate water supply for the Country Club Estates project. However, the effect on the production rate of pre-existing nearby wells is not known; therefore a potentially significant impact was identified. Mitigation to reduce the impact to a less-than-significant level consists of requiring OPUD to monitor the effects of the project's groundwater pumping on the lower groundwater aquifer, and determine whether the project's pumping activities are adversely affecting groundwater levels in the project area. If there is an adverse effect the County and OPUD are required to take corrective action including considering the use of shallower water wells for future projects.

The DEIR for the Country Club Estates project also identified the potential for the project to generate increased rates of stormwater runoff that would affect on- and off-site drainage systems as a significant impact. Mitigation measures that would reduce the potential impacts to a less-than-significant level include a restriction on issuance of occupancy permits by Yuba County until the Feather River levee repair project has been completed and the project area has been remapped by FEMA, restriction on development until a 250-acres stormwater detention/water quality area is completed on the site, and Pump Station No. 1 is operational. The stormwater detention/water quality area would also address potential adverse affects from contaminated urban runoff entering nearby waterways.

The North Arboga Study Area EIR stated that the OPUD has enough water supply to serve its existing residents with a substantial surplus capacity. The EIR also stated that water quality currently does not meet State of California water quality standards but indicated that new wells would address that problem, with the number of new wells depending on the ultimate land use determination. The EIR noted, "Issuance of building permits for projects within OPUD is expressly conditioned upon full participation in the District for the construction and installation of required water lines, wells and treatment facilities, and any supporting equipment required." The EIR required one other water supply mitigation measure, stating that "water service systems for individual projects must be designed to be fully integrated into the OPUD water service system to provide looped water systems...and subject to review and approval of OPUD." The EIR required mitigation for sewer system design

and integration. Several mitigation measures were provided to address drainage and flooding. They required annexing into Reclamation District 784, flood-proofing structures, obtaining approval for abandoning flood inundation easements, submitting drainage plans, and landscaping detention basin and drainage corridor areas. It was determined that implementing these mitigation measures would reduce the impacts to less-than-significant levels. Measures such as landscaping detention basins and drainage corridors would also address potential adverse affects from contaminated urban runoff entering nearby waterways. As discussed above for the Plumas Lake Specific Plan, although there may not be sufficient utility infrastructure to serve a project in a previously undeveloped area prior to development beginning, the project itself includes installation of sufficient infrastructure to meet project demands, as is required by many of the mitigation measures summarized here.

The Bear River project DEIR identified potentially significant impacts associated with increased surface water runoff rates and volumes when compared with the existing conditions, and potentially significant impacts from the alteration of drainage patterns. The DEIR concluded that the mitigation measures provided, including retention of existing drainage conditions for runoff to the south that does not enter existing detention facilities; providing a drainage report that provides technical support to the findings; securing permission from RD 784 to discharge to its facilities; and requiring drainage facilities to comply with Yuba County Improvement Standards, would result in impacts that are less than significant. Several of the measures related to drainage infrastructure would also address potential adverse effects from contaminated urban runoff entering nearby waterways.

The Bear River DEIR also identified potentially significant impacts to water quality from discharge of sediment from the construction site. The DEIR concluded that the mitigation provided, including submittal of erosion and sediment control plans; preparation of a Stormwater Pollution Prevention Plan (SWPPP); and implementation of Best Management Practices on the construction site would reduce these impacts to less than significant.

Water demand by the Bear River project at buildout would be approximately 1,414 acre-feet per year. According to the WSA prepared for the project, the future OPUD service area, including the project site, would have an estimated water demand of approximately 17,794 acre-feet per year by 2030. In addition, other urban areas would require approximately 49,941 acre-feet per year. The total urban water demand in 2030 would be 67,735 acre-feet per year in the entire OPUD service area. Demand for groundwater would decline from 86,800 acre-feet per year in 2004 to 21,200 acre-feet per year in 2016, and remain level to 2030. The decline in demand is attributed to a decrease in demand from agriculture as development occurs in the Plumas Lake area. The combined urban and agricultural demand in the OPUD service area in 2030 would be 88,935 acre-feet per year. The overall balance between supply and demand would result in a water surplus in 2030 of 20,165 acre-feet per year. Therefore, it was concluded that OPUD has ample water available to serve existing and planned future development and potential impacts to groundwater resources were determined to be less than significant. The 20,165 acre-feet per year groundwater surplus estimated in 2030 is approximately 23% of the total demand in 2030. This surplus could accommodate significant additional development beyond 2030 if additional development were to occur. In addition, as stated above, increases in groundwater demand associated with development in the OPUD service area typically results in a corresponding decrease in demand for agricultural irrigation as agricultural lands are converted to development. Therefore, it is likely that the 20,165 acre-feet per year groundwater surplus in 2030 could supply more development than under circumstances where development only results increased demand without resulting in a related decrease in demand in another land use category.

#### **4.1.2.6 BIOLOGICAL RESOURCES**

The Yuba County General Plan EIR provided a qualitative discussion of direct and indirect impacts of the proposed general plan on biological resources. The EIR concluded that the proposed goals and policies of the general plan would reduce the direct and cumulative impacts of the implementation of the general plan to less-than-significant levels. Indirect effects on biological resources that could occur via illegal hunting, domestic dog activity, off-road vehicle use, the use of pesticides and other harmful chemicals, and other factors related to more intense human presence and activity were not addressed by the plan policies. A mitigation measure encouraging public education, mandatory leash laws and requiring Conditions, Covenants and Restrictions (CCRs) for new

developments to protect biological resources was provided to reduce this impact, but the EIR indicated that it remains potentially significant.

The Plumas Lake Specific Plan EIR identified project impacts related to loss of habitat areas, including removal of the riparian forest and scrub areas within the plan area boundaries, as well as potential indirect impacts on and direct removal of permanent water and seasonally ponded wetlands, including Corps jurisdictional wetlands. The analysis provided was qualitative and did not provide specific acreage amounts for habitat impacts. Mitigation measures identified to reduce the impacts to less-than-significant levels included conducting surveys to determine whether special-status species were present; establishing a 50-foot buffer between development and riparian areas; habitat replacement at a ratio of at least 1 to 1 for riparian vegetation and open water with on-site mitigation preferred; consultation with the California Department of Fish and Game (DFG) and/or U.S. Fish and Wildlife Service (USFWS) for impacts to special-status species; establishing nature preserves to conserve sensitive habitats (wetlands); buffer zones between areas of development and wetlands; a mitigation plan to be submitted to the DFG and/or the Corps and obtaining permits as dictated by Section 404 and Section 401 of the federal Clean Water Act (CWA).

The North Arboga Study Area EIR identified potential for impacts to wetlands and the possibility of giant garter snake, tricolored blackbird and valley elderberry longhorn beetle on the site. The analysis provided was qualitative and did not provide specific acreage amounts for habitat impacts. The Final EIR introduced several mitigation measures to reduce impacts on biological resources to less-than-significant levels, including development setbacks from drainages; a biological resource survey; a wetland delineation; documentation and protection of resources; and a revegetation plan.

The Bear River DEIR identified potentially significant impacts to special-status species, including Swainson's hawk nesting and foraging habitat, and burrowing owls, giant garter snake, and northwestern pond turtle. Potential impacts were identified to migratory birds, raptors, wetlands, and valley oak trees. The analysis provided was qualitative and did not provide specific acreage amounts for habitat impacts. Mitigation measures required to reduce impacts to special-status species include preconstruction surveys; avoiding nest disturbance; conservation easements to preserve suitable habitat; limitation on construction activities during nesting season; mitigation planning and measures to avoid take; and coordination and consultation with DFG and USFWS. Mitigation measures for impacts to other resources include; obtaining Section 404 permits for impacts to wetlands; and preparing and implementing a tree protection and replacement plan for valley oak trees. With the implementation of the mitigation measures impacts would be reduced to less-than-significant levels.

The DEIR for the Country Club Estates project identified potentially significant impacts to special-status species and/or the habitat of special-status species, including Swainson's hawk nesting and foraging habitat, giant garter snake, western pond turtle, vernal pool crustaceans, tri-colored blackbirds, valley elderberry longhorn beetle (VELB); and four special-status plant species, dwarf downingia, legene, slender Orcutt grass, and Sanford's arrowhead. The DEIR also identified a potentially significant impact related to the disturbance/fill of approximately 4.1 acres of potentially federally regulated wetlands. Mitigation measures required to reduce impacts to special-status species to less than significant levels include preconstruction surveys; avoiding nest disturbance; preservation of suitable habitats; limitation on construction activities during nesting season and hibernation season; establishing buffer zones and restrictions on certain construction activities, mitigation planning and measures to avoid take; and coordination and consultation with DFG and USFWS. Mitigation measures for impacts to potential waters of the United States, including wetlands, include submitting the available wetlands delineation for verification with the Corps and obtaining Section 404 permits for impacts to wetlands. With the implementation of the mitigation measures, impacts would be reduced to less-than-significant levels.

#### **4.1.2.7 AESTHETIC RESOURCES**

The EIRs for the Yuba County General Plan, Plumas Lake Specific Plan, and North Arboga Study Area found no significant impacts related to aesthetics or scenic resources that would arise from project implementation.

The Bear River Project identified potential aesthetic impacts from the alteration of the agricultural landscape to an urban landscape, obstruction of views from Feather River Boulevard, the introduction of daytime glare, and nighttime lighting. The DEIR found that the proposed park and open space areas along with design guidelines could reduce the significant impacts; however, the impacts due to loss of the agricultural landscape would be significant and unavoidable. Mitigation measures required, including incorporation of height restrictions into the design guidelines, minimizing reflective materials, screening and shielding exterior lighting and landscaping would reduce the remaining impacts to less-than-significant levels.

The DEIR for the Country Club Estates project found significant impacts due to the creation of new sources of light and glare, which would adversely affect day and/or nighttime views in the vicinity of the project. Mitigation measures to reduce the impacts include installing street lighting and public area lighting that is focused downward; using shields on street lighting to prevent light spill to surrounding properties, sky glow, and glare; and minimizing the use of reflective surfaces in public areas and the use of non reflective materials where feasible. This mitigation reduces the impact to a less than significant level.

#### **4.1.2.8 CULTURAL RESOURCES**

The Yuba County General Plan EIR concluded that as a result of new development allowed by the general plan, existing cultural resources would be significantly more susceptible to vandalism, impacts from off-road vehicles, and other indirect effects. This increase in susceptibility would occur because of the greater numbers of people in the county and because of new developments located relatively close to certain cultural resources. The EIR provided a mitigation measure, which recommended adopting a cultural resource protection ordinance, providing for expanding public awareness and public education about the laws and importance of protecting cultural resources, and requiring CCRs for new development to require public information on protecting cultural resources. The EIR concluded this measure would reduce this impact to a less-than-significant level.

The Plumas Lake Specific Plan EIR concluded that development of the specific plan area could disrupt or destroy significant historical sites. Mitigation measures requiring archaeological surveys and evaluation of any resources discovered on the site were identified to reduce this impact to a less-than-significant level.

The DEIR for the Country Club Estates project identified potentially significant impacts and mitigation measures similar to those described above for the Plumas Lake Specific Plan.

The North Arboga Study Area EIR included mitigation to address the potential of exposing prehistoric or historic artifacts or human remains and reduce these impacts to less-than-significant levels. The Bear River DEIR identified potentially significant impacts due the disturbance of previously undiscovered cultural resources, human remains or paleontological resources. Required mitigation measures, including cessation of construction activities and notification of the appropriate authorities, would reduce potential impacts to less-than-significant levels.

#### **4.1.2.9 AIR QUALITY**

The Yuba County General Plan EIR identified significant air quality impacts related to new development, primarily because the air basin is already in nonattainment for some constituents. No mitigation measures were identified that would ensure that this impact could be reduced to a less-than-significant level, so it remains potentially significant.

The Plumas Lake Specific Plan EIR also concluded that development in the plan area could add to a significant cumulative decline in air quality in the region. Mitigation measures to reduce unnecessary vehicle trips; improve transit facilities; encourage carpooling; prohibit residential open burning and reduce emissions from fireplaces and woodstoves were provided, but the impact was identified as remaining significant and unavoidable. The EIR also discussed temporary air quality impacts related to construction dust emissions and hazardous emissions from

construction equipment, which would be reduced to less-than-significant levels by implementing construction period dust control and emissions control measures.

The North Arboga Study Area EIR included three mitigation measures requiring a trip reduction and ridesharing program for companies with 25 employees or more, identifying a park-and-ride location, and preserving a light-rail location. The EIR concluded that implementation of these mitigation measures would reduce potential air quality impacts of study area buildout to less-than-significant levels.

The Bear River DEIR identified potentially significant impacts due to construction-generated emissions and operational emissions that could exceed significance thresholds and contribute to regional non-attainment. Mitigation measures to reduce construction-related impacts include obtaining approval from the Feather River Air Quality Management District (FRAQMD) for an Emissions Reduction Plan for construction equipment, a dust control plan, construction phase trip reduction plan, and use of compliant architectural coatings. These measures would reduce construction-related air quality impacts to less-significant-levels. Mitigation measures to reduce operational emissions include an Emissions Reduction Plan; however, the impacts would remain significant and unavoidable.

The DEIR for the Country Club Estates project identified significant impacts to air quality from construction related emissions and operational emissions. Mitigation measures required to reduce impacts to a less-than-significant level include compliance with FRAQMD and state regulations on limiting construction equipment emissions; dust control measures; construction of energy-efficient buildings; limitation on the use of hearth appliances; and facilitating the use of electrical landscape equipment by installing outside electrical outlets on residential, commercial and public buildings.

As described previously, implementation of levee repairs in FRLRP Segment 2 would remove flood protection as an obstacle to growth in the Segment 2 flood protected area. As shown in Figures 4-1 and 4-2, the planned developments in the Segment 2 flood protected area are the Plumas Lake Specific Plan, the Bear River amendment to the Plumas Lake Specific Plan, the Country Club Estates project, and the western portion of the North Arboga Study Area. Emission calculations were conducted for a development scenario encompassing full buildout of all of these projects (with only the portion of the North Arboga Study Area in the flood protected area included in the analysis).

Based on the environmental documents available for these projects, numbers of homes, extent of industrial and commercial uses, numbers of schools, and other land use characteristics necessary for an air quality analysis were estimated for each project. Land use assumptions were adjusted to account for existing development on each project site currently generating air emissions. For example, if 20 homes were currently on a site, and these were to be replaced by 100 new homes, the net gain in homes (and therefore emission sources) would be 80 homes. The net increase of 80 homes was entered into the emissions model. Project land use data was entered into the URBEMIS 2007 Version 9.2.4 emissions model to calculate both construction and operational emissions (including mobile source emissions) for the overall development scenario. Details on the assumptions entered into, and the outputs from the URBEMIS computer model are included in Appendix I of this FEIS.

Where specific input parameters were not available for the emissions modeling, default assumptions were used. In many instances, especially for assumptions regarding vehicle trip generation, the default assumptions result in an overestimation of actual emissions and model outputs therefore reflect a “worst-case scenario.” The modeling assumed construction would be initiated in 2009 and would proceed at a relatively even pace through full buildout, assumed to occur in 2030.

The model does not account for reductions in construction equipment, vehicle, and area source emissions that would be assumed to occur in the future. For example, vehicles throughout the region are continuously being modernized as consumers replace older vehicles, and the newer vehicles have improved air emission levels. Furthermore, FRAQMD is required to make progress toward compliance with federal clean air standards. It can

be assumed that policies and regulatory programs (requirements for best available control technology) will minimize air quality impacts over time. California Assembly Bill 32 (AB 32) requires statewide reductions in greenhouse gas reductions, which will secondarily result in reductions in pollutant emissions from mobile, stationary, and area wide sources. California is also pursuing legal remedies to receive authorization from EPA to increase fuel efficiency standards in the state. If this legal action is successful, mobile source emissions would be further reduced in the future. However, even with these future emission reduction mechanisms, it cannot be stated with certainty that future air quality, with growth projected to occur throughout the region (see, "Population and Development Trends in the Yuba County Area," above), will be better in the future than it is today. The fact that future emission reductions are not included in the development emissions model is another mechanism by which the modeling reflects a worst-case emission scenario.

The modeling results indicate that under the worse emission conditions, where construction of development under this "Growth Inducing Scenario" is underway and buildout is almost complete (i.e., maximum combined construction and operational emissions), planned development in the flood protected area would generate 500 tons per year (tpy) of reactive organic gases (ROG), 385 tpy of oxides of nitrogen (NO<sub>x</sub>), 1,233 tpy of particulate matter less than 10 microns in diameter (PM<sub>10</sub>), and 234 tpy of PM<sub>2.5</sub>. In the unit of pounds per day (lbs/day), emissions would be 7,876 lbs/day of ROG, 2,271 lbs/day of NO<sub>x</sub>, 7,912 lbs/day of PM<sub>10</sub>, and 1,537 lbs/day of PM<sub>2.5</sub>. Again, it should be noted that these are worst-case emissions. Early in project development operational emissions would be less, and after construction is complete this activity would not contribute to air emissions. Also, as stated previously, for several reasons the model outputs overestimate emission levels that would likely occur. However, even under these circumstances, emissions from planned development in the Segment 2 flood protected area would make it more difficult for Yuba County to achieve attainment for the state ozone and PM<sub>10</sub> standards (Yuba County is currently in non-attainment for these standards) and could result in a substantial contribution toward nonattainment for federal PM<sub>10</sub> and/or PM<sub>2.5</sub> standards. Yuba County is currently in attainment for federal PM<sub>10</sub> standards, but has been proposed for nonattainment for the 2006 national PM<sub>2.5</sub> standard.

#### **4.1.2.10 NOISE**

The Yuba County General Plan EIR recognized significant direct and cumulative noise impacts from the development of noise-sensitive land uses closer to existing railroads and commercial, industrial, and recreational noise sources, and from the development of new commercial, industrial, and recreational noise sources closer to existing noise-sensitive land uses. The EIR also discussed the potential impact of the development of noise-sensitive uses close to the Yuba County Airport, exposing these uses to aircraft noise. The EIR also identifies traffic noise impacts at new noise-sensitive land uses from new and existing roadways, and at existing land uses from new roadways. The exposure of existing noise-sensitive land uses to increased traffic noise from more vehicles using existing roadways was also identified as a significant impact. The mitigation measures to reduce all of these impacts to less-than-significant levels provided for the development of noise level criteria for evaluating impacts to noise-sensitive land uses and requiring acoustical analyses and identification of mitigation measures. The EIR concluded that mitigation may not be possible in some instances, leaving the impact potentially significant.

The Plumas Lake Specific Plan EIR found two significant noise impacts: the effects of railroad, future traffic, and existing industrial noise on noise-sensitive land uses, and the effects of noise from construction activity on surrounding uses. Measures identified to mitigate the impacts to less-than-significant levels included use of site design, setbacks and barriers to avoid exposing sensitive land uses to excessive noise levels; and controlling construction noise by use of mufflers and limiting hours of construction.

The DEIR for the Country Club Estates project identified significant impacts associated with short-term construction noise, increases in existing roadway traffic noise, and on-site traffic noise levels in excess of normally accepted noise criteria for land use compatibility. Measures required to mitigate for the impacts include shielding construction equipment and locating noise-generating stationary equipment away from noise sensitive



land uses. Where future traffic-generated noise levels are predicted to be significant, fair-share contributions to the funding of noise mitigation measures such as sound walls would be required. These measures would reduce project-related impacts to a less-than-significant level.

The North Arboga Study Area EIR identified five separate noise sources as potential problems, including a highway and railroad line. The EIR included mitigation measures to reduce the impacts to less-than-significant levels: a development setback and sound wall nearest highways, rail lines, or future arterials; limiting window air conditioning units, specifying added insulation, and requiring double-pane windows on the side of development nearest the highways or rail lines; specifying limitations to various land uses within airport noise zones; limiting industrial land use noises near residences; limiting industrial land use noises to meet county standards; and limiting public address systems, bells, or electronic signaling devices audible outside buildings.

The Bear River project DEIR identified potentially significant and significant impacts associated with short-term construction noise, exposure of sensitive receptors to excessive noise levels from stationary sources, increases in roadway traffic noise and on-site traffic noise levels in excess of normally accepted noise criteria for land use compatibility. Measures required to mitigate for the impacts include restrictions on the time of day for construction, maintenance of equipment and location of noise-generating stationary equipment, and a sound wall constructed along Feather River Boulevard. These measures would reduce project-related impacts to a less-than-significant level.

#### **4.1.2.11 TRANSPORTATION AND CIRCULATION**

One transportation-related impact identified in the Yuba County General Plan EIR is that growth and development under the general plan could affect the development and maintenance of an efficient and effective roadway system with acceptable levels of service (LOS). Some roads that would need to be widened to ensure acceptable LOS, because of the level of growth allowed by the general plan, might not be widened. A mitigation measure in the EIR proposes, (a) the widening of each such road for which widening is possible, and (b) measures to mitigate the decreased LOS for roads that cannot be widened because of physical constraints. If these measures are effective, the impact would be reduced to a less-than-significant level, but the impact remains potentially significant pending the effectiveness of the measures.

The Plumas Lake Specific Plan EIR discussed LOS impacts on multiple intersections under the “Existing Plus Project Scenario,” all of which would be mitigated to less-than-significant levels. Among the affected intersections that would be adversely affected are SR 70 southbound ramps/McGowan Parkway, SR 70 northbound ramps/McGowan Parkway, SR 70 southbound ramps/Feather River Boulevard, SR 70 northbound ramps/Feather River Boulevard, SR 70 southbound ramps/Plumas-Arboga Road, and SR 70 northbound ramps/Plumas-Arboga Road near the FRLRP project area. Also under the “Existing Plus Project Scenario,” the EIR discussed additional impacts on SR 70 and SR 65 mainlines and interchanges, including the need for major interchange modifications because of projected travel demand at the Algodon Road/Plumas-Arboga Road and Feather River Boulevard interchanges with SR 70, which would remain potentially significant despite mitigation.

Under the “Cumulative Plus Project Scenario,” the Plumas Lake Specific Plan EIR discussed LOS impacts on multiple intersections but indicated that all could be mitigated to less-than-significant levels. These intersections include SR 70 southbound ramps/McGowan Parkway, SR 70 northbound ramps/McGowan Parkway, SR 65 northbound/McGowan Parkway, Feather River Boulevard/Ella Avenue, SR 70 southbound ramps/Feather River Boulevard, SR 70 northbound ramps/Feather River Boulevard, and SR 70 southbound ramps/Plumas-Arboga Road in the FRLRP project area. Also discussed was the impact of future cumulative traffic growth resulting from project implementation on LOS on several roadway segments, which would be reduced to a less-than-significant level with mitigation.

As under the “Existing Plus Project Scenario,” the Plumas Lake Specific Plan EIR discusses additional impacts on SR 70 and SR 65 mainlines and interchanges under the “Cumulative Plus Project Scenario.” These impacts

included increased traffic creating a need for major intersection modification to the Algodon Road/Plumas-Arboga Road and Feather River Boulevard interchanges with SR 70; increased traffic resulting in the need for greater capacity on SR 70; increased public transit demand as a result of increased population; and insufficient funding for improvements because of the lack of an impact fee structure. Intersection and roadway improvements were identified to reduce all of these impacts to less-than-significant levels.

The DEIR analysis for the Country Club Estates project resulted in the conclusion that implementation of the project would worsen operations on Yuba County roadways and at intersections and highways under the control of Caltrans, to unacceptable levels. The project would also create an unmet demand for public transit, would potentially create a substantial increase in conflicts between vehicles and agricultural equipment on Feather River Boulevard, and would increase the potential for vehicle/train accidents at the McGowan Parkway/UPRR at-grade crossing. The mitigation measures identified include intersection improvements for Feather River Boulevard at Anderson Avenue and Broadway and the project applicant being required to pay their fair share costs for ramp and intersection improvements at SR 70 and for future improvements on SR 65 south of Beale Road to Wheatland. Consultation with Yuba County Planning and Yuba-Sutter Transit is required to develop on-site transit facilities and for paying a fair share of funding required for additional transit service to the area. The project applicant is to work with Yuba County staff to install signs on Feather River Boulevard advising motorists of the presence of slow-moving farm equipment and to determine its fair share of the cost of widening shoulders on Feather River Boulevard. The project applicant is to pay development fees to the Yuba County Capital Facilities Fee Program, which includes a project to upgrade the McGowan Parkway/UPRR at-grade crossing.

The North Arboga Study Area EIR introduced mitigation measures to reconstruct, realign, and widen several roadways; implement intersection improvements; and providing a financial strategy and reduced trip generation strategy for cumulative impacts as well as area-wide funding for all traffic mitigation measures to reduce all traffic impacts of plan buildout to less-than-significant levels.

The Bear River project would require construction of new roadways and intersections along Feather River Boulevard to serve the project. The DEIR identified potentially significant impacts associated with traffic generation, which would cause LOS at existing and planned intersections to be degraded to unacceptable levels, and acceptable levels of average daily traffic (ADT) would be exceeded on some roadway segments. Additionally, the project's traffic when combined with traffic generated by other projects planned in the area would result in LOS degradation at additional intersections in the area. The project specific mitigation measures require roadway and intersection improvements, including construction of an interchange at Algodon Road and SR 70; and installation of signals and/or improvements at three other intersections (Feather River Boulevard/A Way East, Feather River Boulevard/River Oaks Boulevard, Feather River Boulevard/SR 70) adversely affected by the project traffic. Roadway widening would be required for a portion of Feather River Boulevard. Additional intersection improvements required include a fair share contribution to the Plumas Lake Boulevard/SR 70 northbound ramp and other roadway and intersection improvements along Feather River Boulevard in the project area. These measures would reduce impacts to less-than-significant levels.

#### **4.1.2.12 PUBLIC SERVICES, UTILITIES, AND PARKS AND RECREATION**

The Yuba County General Plan EIR found no significant impacts related to public services and utilities or parks and recreation resulting from project implementation.

The Plumas Lake Specific Plan EIR discussed how development of the plan area would increase demands for wastewater facilities and service, stormwater facilities, and solid waste collection. The EIR also identified the impact of additional fire service demands resulting from development of the specific plan area, the potential impact of structural and suburban land use related fires resulting from this development, and additional demands for law enforcement services and the anticipated increase in suburban-type crimes. Mitigation measures identified to reduce all of these impacts to less-than-significant levels include: identification of financing for expansion of existing OPUD collection systems, construction of wastewater treatment plant and trunk line system; compliance

with discharge requirements of the Regional Water Quality Control Board; construction and dedication of 21 wells to provide domestic water; design and construct a stormwater drainage system for the project site; and provision for a 24-hour manned fire station and a sheriff's substation in the southern portion of the plan area.

The Plumas Lake Specific Plan EIR also discussed how development of the plan area would remove current recreation opportunities and create demand for additional ones, and would create significant demands for educational facilities and services. Mitigation measures identified to reduce these impacts to less-than-significant levels include: dedication of land, construction of facilities or payment of in lieu fees for recreational facilities; planning by the affected school districts for school facilities within the plan area.

The Country Club Estates project includes development of 20 acres of parkland within the project site. Impacts related to development of these parks are addressed in the DEIR for the Country Club Estates project. Additional in-lieu fees are to be paid to OPUD for development of community parks. The location of future community parks within the OPUD has not yet been determined; therefore, the potential impacts of development of community parks cannot be analyzed at this time. Because the Country Club Estates project is located within the Plumas Lake Specific Plan area, infrastructure such as the water treatment plant, required for the Plumas Lakes Specific Plan would also serve the Country Club Estates project.

The North Arboga Study Area EIR determined that a new fire station and possible expansion of the existing station would be needed to meet increased demand but that existing standards are expected to cover this need. It also stated that schools would be operating at or near capacity and introduced four mitigation measures to address overcrowding.

The Bear River project DEIR identified potentially significant impacts associated with public utilities and services due to increased response time for emergency service providers and loss of open space areas. No feasible mitigation measures are available to reduce these impacts; therefore the impacts are significant and unavoidable. The Bear River Project will be served by OPUD for wastewater treatment. The project would connect to existing OPUD facilities by extending the sanitary sewer facilities that already exist in the southern portion of the Plumas Lake Specific Plan area.

#### **4.1.2.13 RISK OF UPSET/PUBLIC HEALTH AND SAFETY**

The EIRs for the Yuba County General Plan and North Arboga Study Area found no significant impacts related to risk of upset or public health and safety. The Plumas Lake Specific Plan EIR discussed how development could be hindered or slowed by the discovery of and investigation of hazardous materials on-site. Mitigation described that would reduce the impact to a less-than-significant level includes conducting Phase I and Phase II Environmental Site Assessments for developments located in the vicinity of sites with known hazardous materials contamination.

The Country Club Estates project DEIR noted that construction would involve the use, storage and transportation of hazardous materials, potentially creating a safety hazard for people living and working within and adjacent to the project site. This significant impact would be reduced to a less-than-significant level with construction contractors complying with federal, state and local regulations pertaining to handling of hazardous waste. Phase I ESAs were prepared for portions of the project site. The DEIR notes that the project site could be included on a list of hazardous materials sites or could pose a risk from other hazardous materials releases. Following recommendations contained in the Phase I ESAs for removal of debris, structures, storage containers, and stained soils will reduce impacts to less-than-significant levels. Additionally removal and abandonment of septic systems and water wells must be accomplished according to Yuba County Health Department permit requirements. Discovery of previously unknown evidence of hazardous materials would require cessation of construction activities and assessment by a qualified environmental professional. The DEIR also identified a significant impact as a result of the placement of housing within a designated flood hazard area, which would expose people to the risk of flooding due to levee failure. The mitigation measure requires Yuba County to prohibit occupancy of the

site until such time that the Corps certifies the new Feather River levee and associated flood damage reduction measures and FEMA designates the project site as protected from the 100-year flood event.

The Bear River project DEIR identified potentially significant impacts from the placement of residential areas in an area historically subject to flooding, or that could be subject to future localized flooding, and in an area that has been flooded due to levee failure. Additionally potentially significant impacts were identified as a result of placing residential uses in an area where residues from agricultural chemicals might be present. Mitigation measures required to reduce the impacts to less-than-significant levels include construction of storm drain facilities to comply with Yuba County Improvement Standards, the requirement that the on-going program of levee improvements continue and be completed by TRLIA prior to occupancy of any buildings, and preparation of a Phase I Environmental Site Assessment and removal of any identified contaminants from the site prior to construction.

#### **4.1.2.14 PALEONTOLOGICAL RESOURCES**

The Bear River DEIR addressed potential impacts to paleontological resources (see “Cultural Resources” above) and provided mitigation measures to reduce potential impacts to less than significant levels. The EIRs for the Yuba County General Plan, Plumas Lake Specific Plan, and North Arboga Study Area do not address paleontological resources. The DEIR for the Country Club Estates project notes that the project would have the potential to disturb previously undiscovered paleontological resources. The mitigation measures required to reduce the potentially significant impact include cessation of construction activities if potential resources are found, notification of the Yuba County Community Development Department, and consultation with a qualified paleontologist to evaluate the significance of the find, whether avoidance (if necessary) is feasible, or whether data recovery is necessary.

## **4.2 CUMULATIVE EFFECTS**

The analysis of cumulative environmental impacts associated with the FRLRP addresses the potential incremental impacts of the Applicant Preferred Alternative – ASB Setback Levee Alternative and other alternatives in combination with similar effects of other past, present, and probable future projects. The geographic area considered in the analysis varies depending on the particular resource under consideration and the extent to which it could be influenced by the project. The rationale for the selection of each geographic area under consideration in the cumulative impact analysis is described first in this section. This discussion is followed by information on general development trends in the project area. The final subsection describes relevant individual past, present, and future projects.

### **4.2.1 GEOGRAPHIC SCOPE**

The geographic area that could be affected by a project alternative varies depending on the type of environmental resource being considered. When the effects of a project alternative are considered in combination with those of other past, present, and future projects to identify cumulative impacts, the other projects that are considered may also vary depending on the type of environmental effects being assessed. The following are the general geographic areas associated with the different resources addressed in the analysis:

- ▶ Land use—Yuba County since the County is the local agency with land use authority over a majority of the RD 784 area and also because the California Department of Conservation (CDC), the state agency with primary responsibility for the conservation of agricultural land, records, tracks, reports, and responds to conversions of Important Farmland on a county by county basis.
- ▶ Geology, soils, and mineral resources—local (project site) because individual project impacts related to geology and soils typically interact on a cumulative basis in only a very localized area.

- ▶ Water resources and river geomorphology—mostly local (project site; Feather, Yuba, and Bear Rivers), some regional (Sacramento River system). The hydraulic and hydrologic analysis prepared for the FRLRP (MBK Engineers 2006b) supports these geographic parameters for considering cumulative effects related to water resources and geomorphology. A complete copy of the hydraulic and hydrologic analysis is contained in Appendix E of this EIS. The hydraulic model study area includes the Feather River from Oroville Reservoir to the confluence with the Sacramento River; the Sacramento River from the Feather River to the City of Sacramento; the Yuba River from the confluence with the Feather River to Bullards Bar Reservoir; portions of the Bear River, the Natomas Cross Canal, and the Sutter Bypass; as well as various tributaries and smaller waterways associated with those listed here (see Figure 1 of the hydraulic and hydrologic analysis). Therefore, the results of the hydraulic model provide data over a broad area and consider a variety of projects affecting the flood control system within that area. As discussed previously in Section 3.3, “Surface and Groundwater Hydrology and Geomorphology,” the Applicant Preferred Alternative – ASB Setback Levee Alternative and the Intermediate Setback Levee Alternative would result in no measurable increase in flood stage elevation downstream of the Bear River, and would have only beneficial effects (e.g., reductions in flood stage elevations) upstream. As shown in the hydraulic and hydrologic analysis, these beneficial effects would be greatest just upstream of the proposed setback levee, and would continue, although gradually decrease, for several miles upstream. The localized area of project effects supports the use of a more localized geographic area when considering the contribution of the Applicant Preferred Alternative and Intermediate Setback Levee Alternative to potential cumulative effects.
- ▶ Fisheries—mostly local (project site; Feather, Yuba, and Bear Rivers) because the FRLRP and other projects may interact to affect fishery resources on only a very localized basis (e.g., changes in fish habitat occur over a relatively small area).
- ▶ Terrestrial biological resources—mostly local (project site and surrounding areas) because the FRLRP and other projects may interact to affect terrestrial biological resources on only a localized basis (e.g., direct modifications to habitat occur at each project site but extend little beyond the project boundaries).
- ▶ Cultural resources—local area because cultural resources sites are stationary and effects are typically limited to the borders of a project site.
- ▶ Air quality—regional (area under the jurisdiction of the FRAQMD, consisting of Yuba and Sutter Counties).
- ▶ Noise—immediate project vicinity where project effects are noticeable and noise from multiple projects might interact on a cumulative basis.
- ▶ Transportation and circulation—roadways in the project region where traffic generated by multiple projects might interact on a cumulative basis.
- ▶ Public services, utilities, and service systems—local facilities where multiple projects might interact on a cumulative basis to generate increased demand for services.
- ▶ Paleontological resources—local area because paleontological resource sites are stationary and effects are typically limited to the borders of a project site.
- ▶ Socioeconomics and environmental justice—project vicinity where impacts from multiple projects might interact on a cumulative basis to affect the local economy or low income or minority populations.

## 4.2.2 POPULATION AND DEVELOPMENT TRENDS IN THE YUBA COUNTY AREA

Because historical land use patterns underlie general present-day trends in regional and local flood protection efforts and environmental changes, information on historical development is summarized here to provide context

for the discussion of cumulative impacts. This description is followed by a description of current trends in population and agricultural land conversion.

The population of Yuba County grew moderately in recent decades, increasing by 3.4% between 1990 and 2000. The Sacramento Area Council of Governments (SACOG) projects a more rapid population increase for the county in the coming years as approved master planned developments begin construction and transportation improvements stimulate further development in Yuba County (Yuba County Community Development Department 2004). This is evident from population growth since 2000 compared to population growth in the 1990s. According to U.S. Census records, the population in Yuba County grew from 58,228 in 1990 to 60,219 in 2000, an increase of 3.4% (California Department of Finance 2000). The current population as of January 1, 2007, is estimated to be 70,745 (California Department of Finance 2007a), an increase of 17.5% since 2000.

The county's population is projected to reach approximately 80,400 by 2010 and 109,200 by 2020 (California Department of Finance 2007b). Yuba County and the cities within the county are facing numerous regional growth issues pertaining to air quality degradation, traffic generation, biological habitat loss, loss of farmland, and other environmental changes related to urban development. How growth in the RD 784 area affects these environmental issue areas is summarized in Section 4.1.2, "Removing Obstacles to Growth—Flood Protection."

Table 4-2, "Land Use Conversions Involving Important Farmland," shows the most recent data compiled by the Farmland Mapping and Monitoring Program (FMMP) on land use conversions involving Important Farmland (Prime Farmland, Farmland of Statewide Importance, Unique Farmland, and Farmland of Local Importance) in Yuba County. Data are available through 2006.

| <b>Table 4-2</b><br><b>Land Use Conversions in Yuba County Involving Important Farmland</b>                                                                                                                                                                                                                                                  |                                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| Year                                                                                                                                                                                                                                                                                                                                         | Yuba County (Acres)             |
| <b>Total Acreage of Important Farmland Inventoried</b>                                                                                                                                                                                                                                                                                       |                                 |
| 1992                                                                                                                                                                                                                                                                                                                                         | 93,662                          |
| 1994                                                                                                                                                                                                                                                                                                                                         | 94,307–94,419*                  |
| 1996                                                                                                                                                                                                                                                                                                                                         | 95,336–95,347*                  |
| 1998                                                                                                                                                                                                                                                                                                                                         | 93,745–93,756*                  |
| 2000                                                                                                                                                                                                                                                                                                                                         | 90,176                          |
| 2002                                                                                                                                                                                                                                                                                                                                         | 89,217                          |
| 2004                                                                                                                                                                                                                                                                                                                                         | 86,880                          |
| 2006                                                                                                                                                                                                                                                                                                                                         | 85,384                          |
| <b>Total Losses and Gains of Important Farmland</b>                                                                                                                                                                                                                                                                                          |                                 |
| 1992–1994                                                                                                                                                                                                                                                                                                                                    | -69 + 714 = 645 net gain        |
| 1994–1996                                                                                                                                                                                                                                                                                                                                    | -889 + 1,806 = 917 net gain     |
| 1996–1998                                                                                                                                                                                                                                                                                                                                    | -2,428 + 837 = 1,591 net loss   |
| 1998–2000                                                                                                                                                                                                                                                                                                                                    | -4,596 + 1,027 = 3,569 net loss |
| 2000–2002                                                                                                                                                                                                                                                                                                                                    | -2,530 + 1,574 = 956 net loss   |
| 2002–2004                                                                                                                                                                                                                                                                                                                                    | -3,003 + 705 = 2,298 net loss   |
| 2004–2006                                                                                                                                                                                                                                                                                                                                    | -2090 + 595 = 1,495 net loss    |
| * Total number of acres inventoried for these years differs between Farmland Mapping and Monitoring Program reports because of changes in mapping methods.<br>Source: Data compiled by EDAW in 2008 based on online reports prepared by the California Department of Conservation through 2007 (California Department of Conservation 2007). |                                 |



### 4.2.3 PAST, PRESENT, AND FUTURE PROJECTS

This section describes implemented, developed, or planned projects that may result in environmental effects similar to those of the identified alternatives, such that these effects, when combined, constitute cumulative impacts.

#### 4.2.3.1 HISTORICAL FLOOD CONTROL EFFORTS

Early levee construction was conducted primarily by landowners to address local flooding issues and did not consider the hydraulic impacts on other areas or the natural processes of the rivers. The early levees cut off areas of the floodplain and its water storage capacity, causing flood flows to greatly exceed the capacity of channels in many areas. Sediment deposition in river channels from upstream hydraulic gold mining exacerbated the flooding problems by reducing hydraulic conveyance capacities. In the early 1900s, the federal and state governments began constructing systemwide flood management facilities that included levees, weirs, and bypass channels designed to protect lives and property, aid navigation, and flush sediment remaining from hydraulic mining. These conveyance facilities improved flood protection and navigation and allowed continued agricultural and urban development but constrained the rivers to specific alignments, significantly reducing channel meandering, and further isolating rivers from their historical floodplains (U.S. Army Corps of Engineers and State of California Reclamation Board 2002). As agricultural and urban development increased within the floodplain, more communities and properties were at risk of flooding, and system improvements were made periodically to meet local needs. Major modifications, reconstructions, and upgrades have been implemented by the Corps over the years in response to deficiencies identified during flood events.

Large-scale dam construction began in the 1930s and continued into the 1970s. Major dams include Oroville Dam on the Feather River and New Bullards Bar Dam and Englebright Dam on the Yuba River. These and other dams and reservoirs provide flood control benefits by reducing seasonal high flows so that downstream flood conveyance systems can operate more safely and effectively. They also provide numerous other benefits, such as recreational opportunities and water supply for municipal uses, crop irrigation, and energy generation.

#### 4.2.3.2 CURRENT AND PLANNED FLOOD CONTROL EFFORTS

##### Locally Planned Projects

##### *TRLIA's Four-Phase Program of Flood Control Improvements for the RD 784 Area*

As described in Chapter 1.0, the FRLRP is part of a four-phase program of flood control improvements being conducted by TRLIA. Following are the elements of this program, with the exception of the project evaluated in this EIS—FRLRP Segment 2, which is part of Phase 4.

##### Phase 1 Improvements (completed 2004)

**Yuba River Levee:** Construction of a 50 foot-deep slurry cutoff wall through the top of the levee from SR 70 to a site that breached in 1986, for a total length of 2,200 feet.

##### Phase 2 Improvements (completed 2005)

**Yuba River Levee:** Construction of 90- and 300-foot-wide landside seepage berms to protect against underseepage.

**Olivehurst Detention Basin:** Improvements to major drain channels in the Olivehurst basin to accommodate 100-year flows; construction of a detention basin to store floodwaters.

**Western Pacific Interceptor Canal (WPIC) Levee:** Construction of a 500-foot-long, 38-foot-deep slurry cutoff wall and a 1,100-foot, 44-foot-deep slurry cutoff wall to minimize underseepage at Plumas Lake. Also, filling of an existing landside toe ditch to provide protection against underseepage.

**Upper Bear River Levee:** Reconstruction of 300 feet of levee and rock slope protection at the confluence with the WPIC to provide erosion protection.

#### Phase 2 Improvements (completed 2006)

**Olivehurst Detention Basin:** Construction of a ring levee between SR 70 and the Clark Lateral levee.

**WPIC Levee:** Construction of a levee crown raise to provide adequate freeboard.

**Upper Bear River Levee:** Construction of a levee crown raise to provide adequate freeboard and a waterside impervious zone to prevent through-seepage.

**RD 784 Pump Station No. 6:** Removal of the pump station and installation of a new pump station to protect against underseepage at the Algodon Canal.

#### Phase 3 Improvements (completed 2006)

**Lower Bear River Levee:** Construction of a 2-mile-long setback levee to replace 3 miles of existing levee at the confluence of the Bear and Feather Rivers and associated infrastructure (e.g., detention basins, relief wells) and habitat restoration plantings. This project precludes the need to improve the Feather River left bank levee below Pump Station No. 2.

#### Phase 4 Improvements: Upper Yuba River Levee (completed 2006)

Construction of a cutoff wall between the Union Pacific Railroad track and Simpson Lane to protect against underseepage has been completed. Engineering design is progressing on related work to fill a ditch along the water side of the Yuba River levee east of Simpson Lane near the Goldfields.

#### Phase 4 Improvements FRLRP Segments 1 and 3 (underway)

Repair and strengthening of the existing levees in place to correct these deficient levee segments. This work has been separately planned, permitted, and designed, and is being completed on a different schedule from the work that is proposed for Segment 2. With the project approval and permitting processes completed, construction on Segments 1 and 3 began in fall 2007 and will be completed in fall 2008. The levee repairs consist primarily of installation of slurry cutoff walls, stability berms, waterside blankets, and relief wells at various locations along Segments 1 and 3.

#### ***Feather River Setback Levee at Star Bend Project***

This project, to be implemented by Levee District Number 1, is located in Sutter County on the right (west) bank of the Feather River, less than 1 mile northeast of the intersection of State Route 99 (SR 99) and the Garden Highway. The setback levee would have a total approximate length of approximately 3,330 feet and would replace approximately 5,000 feet of the existing right bank Feather River levee.

## **Federal and State Projects**

### ***Emergency Levee Repairs***

The PL 84-99 Rehabilitation Assistance Program is a federal levee rehabilitation program for the repair of levees damaged during declared emergencies for high-water events. “PL 84-99” refers to Public Law 84-99, the federal government’s Flood and Coastal Storm Emergencies Act, which authorizes the Corps and DWR to conduct emergency repairs to flood management works threatened or destroyed by high-water events, such as California’s 1997 and 2006 floods. Work under this program has been completed recently on several sites, including three along the Feather River (RD 10 Levee Mile 1.17, RD 784 Levee Mile 12.7, and RD 784 Levee Mile 19.4). Site 2005-1230-014-001, at RD 10 Levee Mile 1.17, is located to the northeast of the FRLRP area, near State Route (SR) 70. Project site 2005-1230-025-002, at RD 784 Levee Mile 19.4, near Pump Station No. 3, is just north of Star Bend. Site 2005-1230-025-003, at RD 784 Levee Mile 12.7, near Pump Station No. 2, is at the beginning of Segment 1 of the FRLRP.

### ***Sacramento River Flood Control System Evaluation Phase II Project***

The Sacramento River Flood Control System Evaluation Phase II Project (abbreviated as “System Evaluation” or “Phase II”) was initiated by the Corps and DWR to restore the design level of flood protection provided by the levees, and reestablish the 1957 design top-of-levee profile. The project included reestablishing the Feather River levee crest to its original grades, installing a landside stability berm and drain north of Broadway, installing slurry cutoff walls downstream and upstream of Star Bend, and constructing a landside stability berm and drain south of Star Bend. (See Section 1.7.1, “Corps Flood Protection Projects,” for more information.) The System Evaluation project also included Corps installation of slurry walls in two sections of the Marysville ring levee, north of the RD 784 area, in 1996 and 1999.

### **Marysville–Yuba City Mitigation Area**

Adjacent to the Above Star Bend portion of the System Evaluation Project is the 76-acre Marysville–Yuba City Mitigation Area, a site was established by the Corps to mitigate the loss of habitat associated with the System Evaluation levee work in the Marysville and Yuba City areas. This project consolidates mitigation requirements resulting from work on levees into one large area for a better functioning system.

### ***Yuba River Basin Investigation***

In 1998, the Corps completed a feasibility study to increase the level of flood protection to Yuba County. This project, referred to as the Yuba River Basin Investigation or, in short, the Yuba Basin Project, was authorized by Congress in 1999. The objective of the project was to reduce the risk of flooding in RD 784’s service area in a given year to less than the 1-in-200 year storm event and in Marysville to less than the 1-in-300 year storm event. The work consists of extensions and/or additions to the System Evaluation reconstruction work described above. Some of the Yuba Basin Project work has already been completed in conjunction with the System Evaluation work, including work between Feather River Project Levee Mile (PLM) 20.1 and PLM 23.0 (overlapping with the FRLRP Segment 2 area), between PLM 16.6 and PLM 17.1 (overlapping with the FRLRP Segment 1 area), and between PLM 15.9 and PLM 16.6 (overlapping with the FRLRP Segment 1 area). Future project components would include deepening slurry cutoff walls, removing some berms, installing some new slurry cutoff walls, increasing the widths of some berms, adding impervious fill and drain blankets to the levees, relocating slurry cutoff walls from the levee toe to crown, and reshaping some levees. Portions of these activities would overlap with the FRLRP project area.

In 2003, new Corps underseepage guidelines led to re-evaluation of the project, which substantially increased the estimated cost. Because of this cost increase, the project must be reauthorized by Congress. A Yuba Basin General Re-Evaluation Report (GRR) is being prepared for submission to Congress for a new authorization and is expected to be available to Congress for its consideration in 2009. At the request of DWR and YCWA, the non-

federal co-sponsors of the project, further studies for the GRR will address the levee stability issues and expand the project scope to include the southern portion of RD 784 and ecosystem restoration.

### ***Marysville Ring Levee***

North of RD 784, the city of Marysville is encircled by a levee system that protects it from potential flood waters that include Jack Slough to the north, the Yuba River to the south, and the Feather River to the west. Originally constructed in the 1800s, this 7.5-mile-long ring levee has been raised many times to compensate for rising water surface elevations in surrounding waterways as hydraulic mining work upstream of the city caused an accumulation of debris in channel bottoms in downstream water channels. In 1996, the Corps installed a slurry wall along a 0.3 mile section of the Marysville ring levee adjacent to Jack Slough as part of Phase II of the Sacramento River Systems Evaluation Project. Another slurry wall was installed in 1999 along a 0.8 mile section just downstream of the first one near the confluence with the Feather River. Authorization for the 1999 project was provided under the Flood Control and Coastal Emergencies Act for emergency management activities (PL 84-99).

The Yuba Basin Project also addresses modifications to approximately 5 miles of the Marysville ring levee. The Marysville ring levee project is intended to address underseepage and slope stability concerns, and will include slurry walls, stability berms, and levee reshaping. Design and construction for the Marysville ring levee project is proceeding separately from the remainder of the Yuba Basin Project. This approach is possible because the design has not changed substantially from the authorized project, basic technical issues regarding the stability of the ring levee have been resolved, and it is hydraulically separate from the rest of the Yuba River Basin project.

### ***Lake Oroville Surge Operations and Thermalito Afterbay Emergency Reoperation***

The Lake Oroville surge operations (also called Oroville Dam modification) and Thermalito Afterbay emergency reoperation would involve improved flood storage capabilities at State Water Project facilities on the Feather River. Surcharging could be done by managing releases through the spillway gates, although more frequent spills over the emergency spillway would cause erosion of the natural hillside. The proposed emergency reoperation of Thermalito Afterbay would use the operating pool at Thermalito Afterbay for flood control. Both of these measures would need to be implemented by DWR, which owns and operates the Oroville-Thermalito Complex.

### ***Yuba-Feather River Forecast-Coordinated Operations Program***

The Yuba-Feather River Forecast-Coordinated Operations (F-CO) Program is a cooperative planning and model development process directed toward strengthening flood control operations for the Yuba and Feather Rivers. The program objective is to maintain flow targets at key downstream points on the Feather River during high-water events. This objective will be achieved through the following program components:

- ▶ integrating flood control operations of Lake Oroville, operated by DWR, with New Bullards Bar Reservoir, operated by the Yuba County Water Agency (YCWA);
- ▶ improving flood forecasting by installing new gauging stations and refining forecasting methods;
- ▶ developing a Decision Support System with enhanced communication protocols that will improve coordinated operations during major floods; and
- ▶ updating emergency management protocols for both YCWA and the State Water Project.

The program is being implemented cooperatively by YCWA, the National Weather Service, the Corps, and DWR. Improved flood forecasting and coordination of the flood control operations of the Oroville and New Bullards Bar

facilities are expected to provide significant regional flood control benefits downstream, particularly along the Yuba and Feather Rivers.

#### **4.2.3.3 DEVELOPMENT PROJECTS**

Several recent past, present, and probable future development projects could have environmental effects with which the effects of the FRLRP Segment 2 project could combine. Summarized below are descriptions of the major development plans and projects in the RD 784 area, which are shown in Figure 4-1. Four of these projects, the Plumas Lake Specific Plan, Bear River Amendment, Country Club Estates project, and the North Arboga Study Area are also discussed in Section 4.1.2, “Removing Obstacles to Growth—Flood Protection.” As discussed above in Section 4.1.2, because these planned or partially implemented projects are in the area that would be inundated if the FRLRP Segment 2 levee were to breach, implementation of the Applicant Preferred Alternative – ASB Setback Levee Alternative or other action alternatives would remove flood protection as an obstacle to continued implementation of these projects. Because, implementation of the Applicant Preferred Alternative or other action alternatives removes an obstacle to growth relative to these four projects, they are specifically discussed in the evaluation of growth inducing-effects provided above.

##### **Plumas Lake Specific Plan**

The Plumas Lake Specific Plan would develop or redevelop approximately 5,300 acres in the vicinity of historic Plumas Lake. The specific plan area is located west of SR 70 between Olivehurst and the Bear River, just east of the proposed FRLRP levee setback areas. The plan includes low-, medium-, and high-density residential development; shopping centers; business parks; and medical centers. To date primarily residential land uses have been developed in the plan area, with approximately 3,200 of the approximately 12,000 planned homes being built. There are also three elementary schools, a fire station, and a small amount of retail development in the Plumas Lakes area.

##### **Country Club Estates**

Most of the proposed Country Club Estates project is contained within the southwest portion of the Plumas Lake Specific Plan Area. Country Club Estates is a 577-acre planned mixed-use community with 359 acres located within the Plumas Lake Specific Plan area, and 218 acres located outside of and contiguous to the Plumas Lake Specific Plan. Planned land uses consist of approximately 1,135 residential units, a neighborhood commercial area, a middle school, recreation areas, and dedicated open space lands with park trails.

##### **Bear River Amendment**

This project is a proposed amendment to the Plumas Lake Specific Plan. It proposes to add 549 acres of land to the southern portion of the Plumas Lake Specific Plan area and includes 2,123 dwelling units, 31 acres of commercial and business professional land and 72 acres of parks and open space.

##### **East Linda Specific Plan**

The East Linda Specific Plan would develop 1,760 acres, of which 1,330 acres would be residential development and 114 acres would be commercial and business/professional development. The southwestern boundary of the plan area is about 3 miles northeast of the proposed FRLRP levee setback areas. The specific plan area is bounded by the Linda (South Yuba) levee on the north, Erle Road on the south, Yuba College and urban areas of Linda on the west, and Griffith Avenue on the east. Planned land uses include schools, parks, and recreation/floodway easements.

## **Woodbury Specific Plan**

The Woodbury Specific Plan is a proposed specific plan area located south of the East Linda Specific Plan area and east of the SR 65/70 intersection. The 1,633-acre project proposes to construct 6,250 dwelling units ranging from low to high density, and 180 acres of commercial and business professional land, including a town center with mixed uses at its core and a power center adjacent to the highway and future parkway. An EIR has not been completed for this proposed project.

## **North Arboga Study Area**

The North Arboga Study Area consists of approximately 1,300 acres and would provide for approximately 2,500 dwelling units, 205 acres of industrial use, and 10-20 acres of commercial use.

## **Olivehurst Avenue Specific Plan**

The Olivehurst Avenue Specific Plan focuses on approximately 55 acres of underdeveloped exclusively commercial-zoned land that is the business center of the community. One of the stated goals of the specific plan is to rezone and redevelop this commercially-zoned land into unique zones of residential (6.5 acres), commercial (20 acres), public (6.2 acres), and mixed uses (22.5 acres).

### **4.2.3.4 ECOSYSTEM AND HABITAT RESTORATION EFFORTS**

Under the Applicant Preferred Alternative – ASB Setback Levee Alternative and the Intermediate Setback Levee Alternative, land uses in the proposed levee setback area would consist of agricultural operations and habitat restoration activities that are compatible with flood control objectives. It is possible that several hundred acres of habitat in the levee setback area could be restored at some time in the future. This section describes projects related to habitat and floodplain management and restoration in the project area, the effects of which could combine with possible FRLRP restoration activities to result in cumulative effects.

## **Lower Yuba River Fisheries Technical Working Group**

The Lower Yuba River Technical Working Group is a stakeholder group that concentrates on efforts to improve the fishery and environment in the lower Yuba River below Englebright Dam. Members include YCWA, Pacific Gas and Electric Company, USFWS, National Marine Fisheries Service, DFG, DWR, the CALFED Bay-Delta Program, the South Yuba River Citizens League, Friends of the River, the California Sportfishing Protection Alliance, Cordua Irrigation District, RD 784, and other stakeholders. The goal of the group is to improve lower Yuba River fish resources by restoring ecosystem processes and minimizing stressors to fish populations. Emphasis is on anadromous fish populations. The working group is examining options for improving salmon and steelhead passage around Daguerre Point Dam and is developing an Implementation Plan for Lower Yuba River Anadromous Fish Habitat Restoration (South Yuba River Citizens League 2008, Yuba County Water Agency 2002). YCWA has implemented several fisheries studies and enhancement projects on its own, as well as through the Lower Yuba River Technical Work Group.

## **Bear River Levee Setback**

The setback of the lower Bear River levee, Phase 3 of the TRLIA four-phase program described above, includes approximately 520 acres of floodplain habitat restoration, 275 acres of which is in the new levee setback area, with the remainder within the pre-project floodway. The restoration design included high acreages of cottonwood/willow association, valley oak riparian forest, riparian scrub, and grassland/savanna, and shaded riverine aquatic habitat and also areas of seasonal emergent wetland and open water channel. The easternmost portion of the levee setback area and present floodway are being maintained as grassland to meet flood-control objectives and to provide mitigation habitat for Swainson's hawk. A floodplain swale provides seasonal shallow-water habitat.



#### 4.2.3.5 PROJECTS REQUIRING CORPS 33 USC 408 AUTHORIZATION

As described previously in Chapter 1.0, “Purpose of and Need for Action”, to implement the proposed FRLRP Segment 2 levee improvements, TRLIA is requesting permission from the Corps pursuant to Section 14 of the Rivers and Harbors Act of 1899 (Title 33 of the United States Code, Section 408 [33 USC 408]), hereinafter referred to as “Section 408,” for alteration of a federal project levee. There are other projects in the Sacramento and San Joaquin River systems where the Corps has completed Section 408 authorizations, is currently processing requests for Section 408 authorizations, or expects to receive requests for Section 408 authorizations in the near future. These projects are listed below in Table 4-3.

| <b>Table 4-3<br/>Other Section 408 Projects</b>        |                                                                      |                                                  |                                                  |
|--------------------------------------------------------|----------------------------------------------------------------------|--------------------------------------------------|--------------------------------------------------|
| <b>Previously Completed Section 408 Authorizations</b> |                                                                      |                                                  |                                                  |
| <b>Flood Control Project or System</b>                 | <b>Project Title</b>                                                 | <b>Lead Agency/Agencies</b>                      | <b>Status of 408 Request</b>                     |
| Sacramento River Flood Control Project (SRFCP)         | Feather River Segment 1 and 3 Improvements                           | Three Rivers Levee Improvement Authority (TRLIA) | 408 request already approved                     |
| SRFCP                                                  | Natomas Cross Canal and Sacramento River modifications               | Sacramento Area Flood Control Agency (SAFCA)     | 408 request already approved                     |
| <b>Ongoing Section 408 Reviews</b>                     |                                                                      |                                                  |                                                  |
| <b>Flood Control Project or System</b>                 | <b>Project Title</b>                                                 | <b>Lead Agency/Agencies</b>                      | <b>Status of 408 Request</b>                     |
| SRFCP                                                  | Feather River Segment 2 Improvements (project evaluated in this EIS) | TRLIA                                            | 408 request under review                         |
| SRFCP                                                  | Natomas Levee Improvement Project                                    | SAFCA                                            | 408 request under review                         |
| <b>Anticipated Future Section 408 Requests</b>         |                                                                      |                                                  |                                                  |
| <b>Flood Control Project or System</b>                 | <b>Project Title</b>                                                 | <b>Lead Agency/Agencies</b>                      | <b>Estimated Date for Submitting 408 Request</b> |
| SRFCP                                                  | Setback Levee at Star Bend                                           | Levee District No. 1                             | Summer 2008                                      |
| SRFCP                                                  | 2008-2009 Improvements                                               | West Sacramento Flood Control Agency (WSAFCA)    | Mid-2008                                         |
| SRFCP                                                  | 2009-2011 Improvements                                               | WSAFCA                                           | February 2009                                    |
| San Joaquin River Flood Control System (SJRFCS)        | Atlas Tract Levee Realignment                                        | Reclamation District (RD) 2126                   | Mid-2008                                         |
| SJRFCS                                                 | Implementation Repairs (San Joaquin)                                 | RD 17                                            | Mid-2008                                         |
| SJRFCS                                                 | Urban Protection Project                                             | RD 17                                            | 2011                                             |
| SJRFCS                                                 | Implementation Project (Calaveras)                                   | San Joaquin Area Flood Control Agency (SJAFCA)   | Mid-2008                                         |
| SJRFCS                                                 | Urban Protection Project                                             | SJAFCA                                           | 2011                                             |
| SJRFCS                                                 | River Islands Levee Alteration                                       | City of Lathrop                                  | Mid-2008                                         |
| SJRFCS                                                 | Urban Protection Project                                             | RD 404                                           | Late 2008                                        |
| SJRFCS                                                 | Urban Protection Project                                             | RD 404                                           | 2011                                             |

The projects associated with anticipated future Section 408 requests listed above in Table 4-3 are considered reasonably foreseeable since they are expected to occur within the next 10 years. It should be noted that DWR plans to complete a programmatic plan for flood control in the Central Valley. The proposed plan will be a system-wide approach, addressing long-term, cumulative impacts and integrated solutions for various projects.

#### **4.2.4 CUMULATIVE IMPACT ANALYSIS**

Chapter 3.0 of this EIS, “Affected Environment and Environmental Effects,” identifies potential direct environmental effects of the Applicant Preferred Alternative – ASB Setback Levee Alternative and other alternatives. These effects are assessed in the following analysis in terms of their potential to combine with similar environmental effects of the other projects (past, current, and reasonably foreseeable) listed above, resulting in cumulative impacts. The analysis is focused on considering the potential for those impacts identified in Chapter 3.0 to make a considerable contribution to significant adverse cumulative effects.

As explained earlier in this section in the discussion of geographic scope (Section 4.2.1), the extent of the geographic area that may be affected with implementation of the alternatives varies depending on the resource under consideration. Not all projects discussed above would contribute, along with the alternatives, to cumulative environmental effects for each environmental issue area. Therefore, for each discussion below, the past, present, and reasonably foreseeable future projects that are considered are limited to those having potential effects similar to those of the Applicant Preferred Alternative – ASB Setback Levee Alternative and other alternatives and that could interact with impacts generated by Applicant Preferred Alternative and other alternatives.

This cumulative impacts discussion generally describes the localized effects directly attributable to flood control projects. The potential indirect effects of increased flood protection on adjacent areas in RD 784 that would be subjected to inundation due to levee failure (Figure 4-2) are discussed in greater detail in Section 4.1, “Growth-Inducing Effects.” However, the environmental effects of planned development projects in the RD 784 area, as described in Section 4.1, and also including the Woodbury Specific Plan, the East Linda Specific Plan, and the Olivehurst Avenue Specific Plan projects located within RD 784, but outside of the inundation area, are considered in this cumulative analysis as a contributing source to cumulative environmental effects.

The combined environmental effects of flood control projects, as described below, and development projects as described here and in Section 4.1, provide the context for determining whether a significant cumulative impact exists. If a significant cumulative impact exists, then a determination is made as to whether the Applicant Preferred Alternative and other alternatives make a substantial contribution to the significant cumulative impact. If no significant cumulative impact exists, then the addition of impacts associated with the Applicant Preferred Alternative and other alternatives is evaluated to determine whether the addition of these project-specific impacts on the cumulative condition create a significant cumulative impact.

##### **4.2.4.1 LAND USE AND AGRICULTURE**

###### **Applicant Preferred Alternative – ASB Setback Levee Alternative**

Under the Applicant Preferred Alternative – ASB Setback Levee Alternative, a total of approximately 210 acres of Prime Farmland, 35 acres of Farmland of Statewide Importance, and 2 acres of Unique Farmland, or roughly 250 total acres of Important Farmland as defined by the California Department of Conservation, would be permanently converted to nonagricultural uses in the setback levee footprint and levee maintenance area. Approximately 1,045 acres of agricultural land would be within the setback area. Land uses in the levee setback area would consist of agricultural operations and habitat restoration activities that are compatible with flood control objectives. The TRLIA board has adopted a resolution codifying a commitment to maintaining agricultural operations in the setback area, which is provided in Appendix C. Based on the requirements of this resolution, existing information on agricultural operations in the setback area, and anticipated construction disturbance, it is assumed that approximately one half of the roughly 1,045 acres of agricultural lands in the setback area would be converted to non-agricultural uses, with the remainder retained in agricultural operations.

Under these circumstances, approximately 525 acres of agricultural land in the setback area would be taken out of agricultural production and converted to habitat. Of the 525 acres of habitat, approximately 40 acres would be held under a permanent conservation easement for planting of elderberry shrubs (both relocated shrubs and seedlings) and associated riparian species to compensate for elderberry shrubs that would be moved out of the project construction area, in accordance with USFWS requirements. Considering all the mechanisms for removal of agricultural land from production (e.g., setback levee construction, conversion to habitat), for the purposes of this analysis, it is assumed that implementation of the Applicant Preferred Alternative would remove up to 750–800 acres of agricultural land from production; approximately 250 acres of which would be permanently converted for levee construction, approximately 40 acres of which would be converted to habitat and placed under a permanent conservation easement, and the remainder converted to habitat with no deed restrictions requiring the land remain as habitat.

Additional direct conversion of Important Farmland to non-agricultural uses can be attributed to other elements of TRLIA’s flood control program. Phase 3 of TRLIA’s program of flood control improvements, the Bear River levee setback, permanently converted a total of 125 acres of Important Farmland to non-agricultural uses in the footprint of the flood control features and detention basin and converted approximately 275 additional acres of Important Farmland to habitats in the levee setback area (TRLIA 2004b). The Bear River and WPIC Improvement Project resulted in the permanent conversion of only 4 acres of Important Farmland to non-agricultural uses, and the FRLRP Segments 1 and 3, currently under construction, would result in the permanent conversion of approximately 10 acres of Important Farmland to non-agricultural uses (TRLIA 2004a, 2006b). The total direct conversion of Important Farmland to non-agricultural uses that is attributable to TRLIA’s program of flood control improvements, including the Applicant Preferred Alternative, is roughly 410 acres in the footprint of structural features and levee maintenance areas (260 + 125 + 4 + 10), approximately 40 acres converted to habitat mitigation areas placed in permanent conservation easements, and roughly 760 additional acres (485 + 275) in habitat creation areas (See Table 4-4).

| <b>Table 4-4</b><br><b>Important Farmland Conversion: Cumulative Impacts Due to TRLIA Flood Protection Projects</b>                                                                                                                                                                                              |                                                                    |                                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|------------------------------------------------------|
|                                                                                                                                                                                                                                                                                                                  | Applicant Preferred Alternative –<br>ASB Setback Levee Alternative | Cumulative Total of All<br>TRLIA Projects* in RD 784 |
| Important Farmland Conversion in the Levee<br>Repair/Improvement Footprint                                                                                                                                                                                                                                       | 260 acres                                                          | 410 acres                                            |
| Important Farmland Within Setback Area Permanently<br>Converted to Habitat for Mitigation Purposes                                                                                                                                                                                                               | 40 acres                                                           | 40 acres                                             |
| Important Farmland Within Setback Area Converted to<br>Habitat                                                                                                                                                                                                                                                   | 485 acres                                                          | 760 acres                                            |
| <b>Total Important Farmland Conversion for Levee<br/>Improvement Projects</b>                                                                                                                                                                                                                                    | <b>785 acres</b>                                                   | <b>1,210 acres</b>                                   |
| *TRLIA projects included in cumulative impacts total:<br>Feather-Bear River Levee Setback<br>So. Olivehurst Detention Basin<br>Upper Bear and Western Pacific Interceptor Canal Levee Improvement<br>FRLRP Segments 1 and 3<br>FRLRP Segment 2 (Applicant Preferred Alternative – ASB Setback Levee Alternative) |                                                                    |                                                      |

As described above in Section 4.1.2, “Removing Obstacles to Growth—Flood Protection,” the conversion of as much as approximately 1,250 acres of Important Farmland to non-agricultural uses can be attributed to the combined planned developments in the area protected from inundation by the FRLRP Segment 2 levee. Continued development of these four projects (Plumas Lake Specific Plan, Bear River Amendment, Country Club Estates project, and the North Arboga Study Area), can be indirectly attributed to the planned Segment 2 flood control improvements, which remove an obstacle to growth.

Full implementation of all the development projects described above in Section 4.2.3, “Past, Present, and Future Projects,” and shown in Figure 4-1 (i.e., also including the Olivehurst Avenue Specific Plan, East Linda Specific Plan, and Woodbury Specific Plan) would result in the conversion of approximately 7,685 acres of Important Farmland to development. Some of this conversion has already taken place as development has proceeded: the data in Table 4-2 reflect the conversion of a portion of the total 7,685 acres of Important Farmland within the combined planned development areas, including the Plumas Lake, North Arboga, and East Linda plan areas, which are all partially developed.

Permanent conversion of Important Farmland in the RD 784 area attributable to full implementation of all past, present, and reasonably foreseeable future projects listed in Section 4.2.3 would be approximately 7,685 acres for development projects (approximately 1,250 acres of which would be attributable to the growth inducing effects of the Applicant Preferred Alternative) and 440 acres for flood protection projects, totaling 8,125 acres. Up to an additional 760 acres of Important Farmland is/would be converted to habitat from flood protection improvement projects, but this land would not be placed under permanent conservation easements.

As shown in Table 4-2 the latest FMMP data indicate that from 1992 through 2006 (the most recent year for which data are available), Yuba County experienced a cumulative net loss of Important Farmland (consisting of land classified as Prime Farmland, Farmland of Statewide Importance, Unique Farmland, and Farmland of Local Importance). Net gains in Important Farmland were recorded for the county for the 1992–1994 (+645 acres) and 1994–1996 (+917 acres) periods; however, these were slightly more than offset by losses in the 1996–1998 period (-1,591 acres). Net losses in Important Farmland have continued in Yuba County for the 1998–2000 (-3,569 acres), 2000–2002 (-956 acres), 2002–2004 (-2,298 acres), and 2004–2006 (-1,495 acres) periods. The total cumulative net loss of Important Farmland in Yuba County since 1996 (when net losses began to be recorded) is 9,909 acres, which is 11.6% of the total Important Farmland inventoried in 2006 (85,384 acres).

Given the county wide loss of Important Farmland from 1996 through 2006, coupled with additional acreage lost between 2006 and present, and several thousand additional acres that could be lost in the RD 784 area through future implementation the Applicant Preferred Alternative and the development projects shown in Figure 4-1, the total loss of Important Farmland loss in the County could exceed 17,000 acres, or 20% of the 2006 total. This is considered a significant adverse cumulative effect. The question then becomes whether the Applicant Preferred Alternative makes a considerable contribution to this significant adverse cumulative effects.

The permanent conversion of Important Farmland associated with setback levee construction and placement of land under habitat conservation easements for mitigation purposes under the Applicant Preferred Alternative would total approximately 290 acres, or roughly 1.7% of the approximately 17,000 acre total potential cumulative net loss in Yuba County described above. If the conversion of Important Farmland to habitat in the setback area is also considered, the removal of up to approximately 775 acres of Important Farmland from production resulting from the Applicant Preferred Alternative would constitute approximately 4.6% of the cumulative net loss in Yuba County. Although this percentage is larger than for setback levee construction alone, the conversion of agricultural land to habitat is not considered an irretrievable conversion. If the growth inducing effect of the Applicant Preferred Alternative removing existing and planned development from the 100-year floodplain is considered, the total conversion of Important Farmland directly and indirectly attributable to the Applicant Preferred Alternative would be 2,025 acres (290 acres direct irretrievable removal, 485 acres direct conversion to habitat, 1,250 acres indirect effect through facilitating future development). This constitutes roughly 11.9% of the approximately 17,000 acre total potential cumulative net loss of Important Farmland in Yuba County described

above. This is considered a considerable contribution to the significant adverse cumulative effect of loss of Important Farmland in Yuba County.

It should be noted that as part of implementation of the Applicant Preferred Alternative land maintained in agricultural use in the setback area would be protected in perpetuity from future development pressure by being placed in the Feather River floodway. In addition, the proposed improvements to the flood control system would benefit thousands of acres of valuable agricultural land in the RD 784 area, including prime farmland and other Important Farmland, by providing increased protection from future flood damages. In spite of these benefits, the conclusion does not change that the combined direct and indirect conversions of Important Farmland attributable to the Applicant Preferred Alternative are considered a considerable contribution to the significant adverse cumulative effect.

Although implementation of the Applicant Preferred Alternative would result in the direct conversion of several hundred acres of agricultural land to non-agricultural uses, it would not conflict with the intent of Yuba County policies for the preservation of agricultural land. Much of the land in the setback area would be maintained in agricultural use and would be protected in perpetuity from future development pressure by being placed in the Feather River floodway. Existing agricultural land in the setback area that would be converted to habitat, but not placed within a habitat conservation easement, would not lose its potential as productive agricultural land. Furthermore, the proposed improvements to the flood control system would benefit thousands of acres of valuable agricultural land in the RD 784 area, including Prime Farmland and other Important Farmland, by providing increased protection from future flood damages. Even if the Applicant Preferred Alternative were inconsistent with Yuba County land use policies and zoning, these effects are project specific and limited to a local site; therefore, they are not considered to contribute to a cumulative impact related to consistency with local land use policies.

### **Intermediate Setback Levee Alternative**

Under the Intermediate Setback Levee Alternative, the setback levee footprint and levee easements would permanently convert approximately 210 acres of Prime Farmland, 10 acres of Farmland of Statewide Importance, and 5 acres of Unique Farmland to nonagricultural uses, or roughly 225 total acres of Important Farmland. It is assumed that the setback area under this alternative would be managed in a manner similar to that described for the Applicant Preferred Alternative – ASB Setback Levee Alternative, with about half of the setback area retained in agricultural operations and remaining lands converted to habitat. Under these circumstances, up to approximately 360 acres of Important Farmland in the setback area would be taken out of agricultural production and converted to habitat. Of the 360 acres, approximately 40 acres would be placed under a habitat conservation easement as part of mitigation requirements and would therefore be considered a permanent conversion of agricultural land to another use. Therefore, the Intermediate Setback Levee Alternative could result in the permanent conversion of up to approximately 270 acres of important farmland to another use. These conversions of Important Farmland are less than those assumed for the Applicant Preferred Alternative. However, for the reasons described above for the Applicant Preferred Alternative, the Intermediate Setback Levee Alternative would be considered to make a substantial contribution to a significant cumulative conversion of Important Farmland to non-agricultural uses, but would not conflict with the intent of Yuba County policies for the preservation of agricultural land.

### **Levee Strengthening Alternative**

Implementation of the Levee Strengthening Alternative could result in the direct conversion of up to approximately 26 acres of Important Farmland (assuming agricultural land affected is Important Farmland) to another land use (e.g., seepage and stability berms, relocation of Pump Station No. 3). This level of Important Farmland conversion is substantially less than the amount estimated for the Applicant Preferred Alternative – ASB Setback Levee Alternative. However, like the Applicant Preferred Alternative and Intermediate Setback Levee Alternative, removal of flood protection as an impediment to growth resulting from implementation of

The Levee Strengthening Alternative could indirectly result in the conversion of approximately 1,250 acres of Important Farmland through implementation of planned development projects protected by the FRLRP Segment 2 levee. The approximately total 1,276 acres of direct and indirect conversion of Important Farmland constitutes roughly 7.5% of the approximately 17,000 acre total potential cumulative net loss of Important Farmland in Yuba County described above. This is considered a considerable contribution to the significant adverse cumulative effect of loss of Important Farmland in Yuba County.

### **No-Action Alternative**

The No-Action Alternative would not involve construction activity beyond minor levee repairs (i.e., repairs not triggering NEPA, 408 authorization, or a CWA 404 individual permit) or indirectly facilitate future development. Although loss of Important Farmland could result from flooding in the event of a catastrophic levee failure under the No-Action Alternative, the magnitude of such an effect and its contribution to any significant cumulative impacts cannot be estimated.

#### **4.2.4.2 GEOLOGY, SOILS, AND MINERAL RESOURCES**

##### **Applicant Preferred Alternative – ASB Setback Levee Alternative**

Although construction activities associated with implementation of the Applicant Preferred Alternative – ASB Setback Levee Alternative would disturb earth, thereby potentially accelerating erosion, construction disturbance would be temporary and soils in disturbed areas would be vegetated or otherwise stabilized after construction is complete. In addition, the levee setback area is nearly level and is well drained, and the risk of erosion and associated hazards is slight. Some soil erosion could also occur during flood operations when flows pass through the levee setback area, but because velocities would be low, erosion potential is not considered high. In addition, vegetative cover in the levee setback area (agriculture or habitat) would reduce the potential for erosion. Consequently, there is only a minimal risk of soil erosion hazard, if any, associated with the proposed levee setback. In addition, planned projects in the local area are on the same level terrain as the Applicant Preferred Alternative and would need to prepare and implement a Stormwater Pollution Prevention Plan (SWPPP) consistent with the National Pollutant Discharge Elimination System (NPDES) program, like the Applicant Preferred Alternative. Therefore, planned projects in the local area would not result individually or cumulatively in significant erosion hazards (potential effects of erosion on water quality are evaluated below in the discussion of water resources and river geomorphology). As described above in Section 4.1.2, “Removing Obstacles to Growth—Flood Protection,” either planned development projects in the RD 784 area would not result in significant impacts related to geology, soils, and mineral resources, or significant impacts would be mitigated to less-than-significant levels. Therefore, the Applicant Preferred Alternative would not make a cumulatively considerable contribution to any significant soil erosion impact.

The setback levee would be engineered and constructed to modern standards with appropriate seepage control features, making it more stable than the existing levee and decreasing the risk of levee failure associated with geologic/soils/seismic hazards. This is a beneficial effect. With FRLRP Segments 1 and 3, other TRLIA flood control projects, the Corps levee improvements conducted as part of the System Evaluation Project and as a result of the Yuba River Basin Investigation, and the other levee improvements planned for the area by YCWA, a similar beneficial effect would occur on a cumulative level. The Applicant Preferred Alternative would contribute to this cumulative beneficial effect.

##### **Intermediate Setback Levee Alternative**

Geologic-, soils-, and erosion-related effects associated with the Intermediate Setback Levee Alternative would be the same as the effects described above for the Applicant Preferred Alternative – ASB Setback Levee Alternative. For the reasons described above, the Intermediate Setback Levee Alternative would not result in a considerable contribution to any significant adverse cumulative soil erosion hazard impacts, and would contribute to a



beneficial cumulative impact related to reducing geologic/soils/seismic hazards in combination with other flood control projects.

### **Levee Strengthening Alternative**

Geologic-, soils-, and erosion-related effects associated with the Levee Strengthening Alternative would be substantially similar to the effects described above for the Applicant Preferred Alternative – ASB Setback Levee Alternative. However, the Levee Strengthening Alternative would not place additional land within the floodway and would therefore result in somewhat less potential for erosion occurring on additional land. Therefore, the Levee Strengthening Alternative would not result in a considerable contribution to any significant adverse cumulative soil erosion hazard impacts, and would contribute to a beneficial cumulative impact related to reducing geologic/soils/seismic hazards in combination with other flood control projects.

### **No-Action Alternative**

Because only minor levee repairs (i.e., repairs not triggering NEPA, 408 authorization, or a CWA 404 individual permit) could be implemented under the No-Action Alternative, the existing erosion-related deficiencies in the levees would likely become exacerbated. This would be considered an adverse effect that would not occur under the other project alternatives. However, these erosion effects are localized and likely would not interact with any erosion hazards generated by other projects.

#### **4.2.4.3 WATER RESOURCES AND RIVER GEOMORPHOLOGY**

##### **Applicant Preferred Alternative – ASB Setback Levee Alternative**

Potential changes in land use associated with the Applicant Preferred Alternative – ASB Setback Levee Alternative would not have a direct adverse effect on local water demand and supply and may, in fact, cause demand to decrease within the FRLRP Segment 2 area. Effects of the levee setback related to sediment deposition in the setback area are not expected to be measurable. No other known flood control projects would contribute to similar potential effects in a manner that would result in a significant cumulative impact. As described above in Section 4.1.2, “Removing Obstacles to Growth—Flood Protection,” planned development in the RD 784 area could have a significant impact on water demand and sediment deposition, but these impacts are mitigated to a less-than-significant level. Therefore, there would be no cumulative effect on water supply or sediment deposition to which the levee setback would make a considerable contribution.

The proposed setback levee would cross existing drainage infrastructure and sever parts of the drainage system for the local area. Drainage patterns within the levee setback area could be changed by project implementation as well. Mitigation described in Section 3.3, “Surface and Groundwater Hydrology and Geomorphology,” would preclude any adverse effects of a levee setback on local drainage. These effects are project specific and limited to a local site; therefore, they are not considered to contribute to a cumulative adverse effect.

With a reduction in water surface elevations at and above the proposed levee setback area, peak flows in the Feather River downstream of the setback levee would increase slightly, from 271,938 cubic feet per second (cfs) to 272,406 cfs during the 1-in-100 AEP event, an increase of less than 1%. Modeling results indicate that the slight increase in flows would result in an increased water surface elevation of 0.02 foot in the Feather River from the southern end of the setback levee alignment to the confluence with the Bear River. A complete copy of the hydraulic and hydrologic analysis is contained in Appendix E of this EIS. It should be noted that the hydraulic modeling assumes completion of all levee improvements protecting the RD 784 area. Therefore, modeling results reflect conditions that are in effect with all TRLIA past, present, and future projects listed above in place. For the 1-in-200 AEP event, the flows would increase from 347,031 cfs to 348,879 cfs, an increase of less than 1%. The water surface elevation in the Feather River from the southern end of the setback levee alignment to the confluence with the Bear River is expected to increase by 0.08 foot as a result of the increased flow. These

increases in downstream floodwater flows with the proposed levee setback are small (less than 1%), and the increases in downstream flood stage elevation would be less than 1 inch for the 1-in-100 and 1-in-200 AEP events. In addition, with implementation of the F-CO, any increases in downstream flood stage elevations associated with the Applicant Preferred Alternative would be less than described above. Adverse effects associated with this very slight increase in flood stage elevation would not provide a substantial contribution to any cumulative effect, if one were to occur.

It should be noted that a separate round of hydraulic modeling was conducted to specifically evaluate whether the interaction between the Applicant Preferred Alternative – ASB Setback Levee Alternative and the proposed Feather River Setback Levee at Star Bend Project listed in Section 4.2.3 would result in different effects than those described above. The results of this modeling are provided in Appendix J. The modeling indicates that the Feather River Setback Levee at Star Bend Project, combined with the Applicant Preferred Alternative, would in most cases result in a reduction in flood stage elevations compared to the Applicant Preferred Alternative alone. The maximum reductions would be 0.21 feet and 0.25 feet during the 1-in-100 and 1-in-200 AEP events respectively. These reductions would occur at River Mile 18.25, between the southern end of the proposed setback levee and the northern end of Setback Levee at Star Bend Project. Water surface elevation increases would only occur at one location when the Setback Levee at Star Bend Project is combined with the Applicant Preferred Alternative, at River Mile 16.5 near the southern end of the Setback Levee at Star Bend Project. At this location, water surface elevations would be 0.02 feet and 0.04 feet greater during the 1-in-100 and 1-in-200 AEP events respectively. Combining the Setback Levee at Star Bend Project with the Applicant Preferred Alternative has no affect on flood stage elevations relative to the Applicant Preferred Alternative alone starting at River Mile 16.25 and continuing downstream.

As identified above, the hydraulic modeling used to evaluate the Applicant Preferred Alternative assumes completion of all levee improvements in the RD 784 area and shows no significant adverse hydraulic/hydrologic effect when the Applicant Preferred Alternative (one of the last elements of the TRLIA flood protection effort) is considered concurrently with all other TRLIA RD 784 repairs. The addition of a non-TRLIA project, the Feather River Setback Levee at Star Bend Project, does not alter this conclusion. Given these conditions, no significant adverse cumulative hydraulic/hydrologic effect would occur from implementation of these projects.

The existing FRLRP Segment 2 levee has been determined to have geotechnical deficiencies which would be addressed by the Applicant Preferred Alternative – ASB Setback Levee Alternative. The correction of levee deficiencies that could cause a levee failure at less than the design flow must be completed. These actions do not represent a transfer of risk or an unacceptable impact to the system because the system was intended to carry the design flow. An example of this condition would be erosion that has reduced the levee section. This erosion must be repaired and does not represent a transfer of risk or an unacceptable change from the existing condition.

Another element of whether construction of the Applicant Preferred Alternative could represent an unacceptable transfer of flood risk to adjacent or downstream levee districts is the reduction in frequency in which flood waters enter the RD 784 area. This could potentially create some degree of risk that flood water may be redirected to another basin upstream or downstream of the protected area. The question is whether the impacts of such risk shifting are significant and warrant compensatory measures outside of RD 784. It is important to note that the correction of existing project deficiencies does not represent a transfer of risk or unacceptable change from the existing condition. The existing FRLRP Segment 2 levee also creates a narrow channel and construction of the Applicant Preferred Alternative – ASB Setback Levee Alternative would widen the floodway and open up a choke point in the Feather River, thus providing regional flood damage reduction benefits. Sutter County and Levee District 1 (across the river) and SAFCA (downstream) have issued letters of support for the Applicant Preferred Alternative because of these regional benefits. The Applicant Preferred Alternative – ASB Setback Levee Alternative would be built to modern engineering standards and would have a much lower probability of failure when compared to the existing deficient condition.

The levees in the SRFCP were built to a design stage commonly referred to as the “1957 design profile.” When the Corps transferred the SRFCP to the State of California for operation and maintenance, the Corps concluded that the levees met all engineering standards to pass the design flow at the design stage. This is documented in the 1953 Memorandum of Understanding (MOU) between the Corps and the Reclamation Board (on behalf of the State of California). The Reclamation Board (now the CVFPB) is required to maintain the SRFCP levees to this condition. However, based on application of current engineering standards for levee design and consideration of new geotechnical data for the SRFCP, it is clear that many of the SRFCP levees, including the FRLRP Segment 2 levee, do not meet current engineering standards at the “1957 design profile.”

The common method of assessing transfer of risk is a hydraulic impact analysis. This analysis has been conducted for the Applicant Preferred Alternative – ASB Setback Levee Alternative and is included in Appendix E of this EIS. The analysis demonstrated that at the “1957 design profile” the only upstream impacts are beneficial (through the reduction of water surface elevations). The analysis also demonstrated that at the “1957 design profile” there are no significant impacts downstream.

TRLIA’s design standard is the 200-year water surface elevation. In the FRLRP Segment 2 area there is no substantive difference between the 200-year water surface elevation and the “1957 design profile” (see Appendix E, 1997 Technical Memorandum, Figure 4). This is because the “1957 design profile” was computed before the construction of Oroville and New Bullards Bar dams and before the enlargement of the Feather River channel that resulted from the erosion of hydraulic mining debris deposited over 100 years ago. Because of these changes, the Feather River currently has a higher level of protection at the “1957 design profile” (once the levees are made secure) than other portions of the SRFCP. The Applicant Preferred Alternative – ASB Setback Levee Alternative lowers the water surface elevation for the “1957 design flow” and provides a beneficial impact to the SRFCP. The decreased risk of levee failure does not affect the intended performance of other parts of the SRFCP. The decreased risk of levee failure is consistent with the design intent of the SRFCP which did not rely on upstream levee failures to protect downstream floodplains.

Implementation of the Applicant Preferred Alternative – ASB Setback Levee Alternative could result in changes in geomorphic processes by altering velocities in the existing floodway in the project area and upstream, leading to decreased shear stresses. Any increases in shear stresses would be minor and would not result in erosion of the levee system or substantial increases in the mobilization and/or deposition of sediments. None of the other projects included in this cumulative analysis, when considered together with the Applicant Preferred Alternative, would contribute substantially to potential effects associated with increased shear stresses. Therefore, no significant cumulative adverse effect would occur related to geomorphology.

The planned and proposed development projects listed above have the potential to incrementally increase runoff associated with storm events by increasing impervious surfaces within the Feather-Yuba River watershed. This runoff could carry urban contaminants such as oil dripping from automobiles onto streets and driveways and excess lawn fertilizer into nearby waterways. However, these developments are required to implement measures to decrease runoff volumes (e.g., channeling runoff over landscaped areas) and mitigate increases in runoff through the construction and operation of detention basins and other facilities (see Section 4.1.2, “Removing Obstacles to Growth—Flood Protection”). Many of these same measures also trap or treat contaminants carried by the runoff before it enters nearby waterways. The East Linda Specific Plan EIR concluded that development of the specific plan area could increase the rate and amount of surface-water runoff, resulting in erosion during construction activity; alter the course of floodwaters; and change the quantity of groundwater. Mitigation measures required included limiting paved areas; installing sediment traps, evaporation basins and flow reduction devices in the storm drain system; limiting the area of exposed soil and employing erosion control measures during construction phases; channeling roof runoff onto landscape areas; maintaining a 50-foot building setback from open channels and lakes; and obtaining a Streambed Alteration Agreement from DFG for construction in the 100-year floodplain of the Linda-Olivehurst Drain. Any increase in runoff volumes and contaminant loading from these developments that reaches the surrounding rivers during storm events would be a minor incremental contribution to river flows and contaminant levels and would not result in a significant cumulative impact.

It should be noted that existing agricultural lands in the proposed development areas provide an unregulated source of stormwater and irrigation runoff entering the river system that can carry contaminants such as fertilizers and pesticides. This potential contaminant source would be replaced by runoff from urban development, which is regulated under the National Pollutant Discharge Elimination System (NPDES) program. Therefore, development does not generate a new source of runoff, but replaces an existing source of runoff.

Because the increased risk of downstream flooding associated with the proposed levee setback would also be minor, this effect is considered to be inconsequential in a cumulative context as well as in a direct sense. Therefore, the Applicant Preferred Alternative – ASB Setback Levee Alternative would not be considered to contribute to a substantial cumulative adverse effect related to potential downstream flooding due to changes in downstream hydrology.

Setting back the left bank Feather River levee along the proposed setback levee alignment would decrease flood stages on the river. The levee setback would also provide a well-designed, well-constructed levee that would be more reliable and less subject to seepage than the existing levee. These changes would improve local flood protection, providing a beneficial effect. The Applicant Preferred Alternative would combine with the effects of other recent and planned flood control projects to result in a cumulatively beneficial effect on flood protection in the Feather-Yuba River Basin above the confluence of the Feather and Bear Rivers.

Potentially hazardous materials related to existing agricultural activities could be transported downstream when the proposed levee setback area becomes inundated during flood events. These materials could contaminate floodwater and adversely affect river water quality. However, mitigation described in Section 3.5, “Hazardous Materials,” would reduce the potential for the release of hazardous materials. For this reason, the levee setback is not expected to result in a considerable contribution to a cumulative adverse effect related to water quality.

### **Intermediate Setback Levee Alternative**

The levee setback area would be somewhat smaller under the Intermediate Setback Levee Alternative than under the Applicant Preferred Alternative – ASB Setback Levee Alternative because portions of the intermediate setback levee alignment are located farther to the west than the proposed setback levee alignment. Modeling results indicate that with a reduction in water levels at and above the intermediate levee setback area, peak flows in the Feather River downstream of the setback levee would increase slightly, from 271,938 cfs to 272,262 cfs during the 1-in-100 AEP event, an increase of less than 1%. This slight increase in flow is expected to result in a 0.02-foot increase in the water surface elevation in the Feather River from the southern end of the setback levee alignment to the confluence with the Bear River. For the 1-in-200 AEP event, modeling results show that the flows would increase from 347,031 cfs to 348,624 cfs, an increase of less than 1%. The water surface elevation in the Feather River from the southern end of the setback levee alignment to the confluence with the Bear River is expected to increase by 0.07 foot as a result of the increased flow. These increases in downstream floodwater flows with the intermediate levee setback are small (less than 1%), and the increases in downstream flood stage elevation would be less than 1 inch for the 1-in-100 and 1-in-200 AEP events. In addition, with implementation of the Forecast-Coordinated Operations of Lake Oroville and New Bullards Bar Reservoir (F-CO), any increases in downstream flood stage elevations associated with the intermediate levee setback would be less than described above. Adverse effects associated with this very slight increase in flood stage elevation would not provide a substantial contribution to any cumulative effect, if one were to occur.

Due to the smaller setback area size under the Intermediate Setback Levee Alternative, cumulative effects would be similar to, or less than those described above under the Applicant Preferred Alternative related to water demand, sediment deposition, drainage infrastructure, geomorphology, increased stormwater runoff entering the river system, stormwater runoff carrying contaminants into the river system, beneficial flood protection effects, transfer of risk, and hazardous material transport.

For the reasons described above, the Intermediate Setback Levee Alternative is not expected to result in a considerable contribution to any substantial cumulative adverse effects related to water resources and river geomorphology.

### **Levee Strengthening Alternative**

Levee strengthening activities could allow sediment to enter local waterways via erosion, resulting in adverse effects on water quality and contamination of waterways by toxic substances. Mitigation described in Section 3.4, “Water Quality,” however, would ensure that appropriate erosion control and spill containment measures would be implemented, including preparation and implementation of a SWPPP, to minimize any potential for water quality effects. Other levee reconstruction and repair efforts in the area will be required to incorporate similar measures to ensure the protection of water quality from potential sedimentation and effects of toxic spills. For these reasons, levee strengthening activities would not make a cumulatively considerable contribution to any substantial cumulative adverse effect related to water quality. In addition, levee strengthening would combine with the effects of other recent and planned flood control projects to result in a cumulatively beneficial effect on flood protection in the Feather-Yuba River Basin above the confluence of the Feather and Bear Rivers. Furthermore, strengthening of the existing levee would not change flood stage elevations; therefore, these activities would not result in any long-term changes to the existing drainage pattern of the project site, would not affect the rate or amount of surface runoff in the project area, and would not reduce water supply or alter regional or local hydrology. Therefore, the Levee Strengthening Alternative would not make a substantial contribution to any potential cumulative effects related to sediment deposition, water supply, or geomorphic processes.

### **No-Action Alternative**

Because only minor levee repairs (i.e., repairs not triggering NEPA, 408 authorization, or a CWA 404 individual permit) could be implemented under the No-Action Alternative, this alternative would make little to no contributions to any beneficial cumulative effects associated with improved flood protection. The No-Action Alternative would continue the substantial flood risk condition in the RD 784 area.

#### **4.2.4.4 FISHERIES**

##### **Applicant Preferred Alternative – ASB Setback Levee Alternative**

Flood operations with implementation of the proposed levee setback have the potential to result in the stranding and mortality of fish, including protected species, in areas within the expanded floodway (i.e., levee setback area) where water collects and fish become trapped as floodwaters recede. This effect, if not mitigated, could combine with the deleterious effects of more than 150 years of past actions in the Sacramento River Basin that have reduced populations of chinook salmon, steelhead, and green sturgeon in the region enough that these are now designated special-status species. Levee projects in general have had a significant adverse cumulative effect on these species. However, to reduce the potential for fish to become stranded in the levee setback area, a drainage and grading plan for the area would be developed and implemented in consultation with NMFS and DFG as described in Section 3.8, “Fisheries.” The plan would ensure that the project design incorporates appropriate features to minimize the potential for stranding and ensure that only a minor incidental loss of fish would result from the levee setback (a loss expected to be greatly offset by increases in growth and survival of juvenile fish that would use new habitat created in the levee setback area). The Corps has consulted with NMFS under Section 7 of the Endangered Species Act (ESA) regarding the Applicant Preferred Alternative – ASB Setback Levee Alternative. NMFS has provided a letter concurring with a determination that the Applicant Preferred Alternative will not adversely affect fish species under its jurisdiction (Appendix H). For these reasons, the Applicant Preferred Alternative would not contribute considerably to any significant cumulative adverse effect on fish populations.

Under the Applicant Preferred Alternative, some portion of the proposed levee setback area would be converted to riparian, wetland, or other habitat. Both habitat areas and agricultural lands in the setback area would provide additional floodplain habitat for fish along the Feather River and could potentially improve the success of fish species that use the area. This potential benefit could make a considerable contribution to cumulative benefits to fish that may be derived from projects that expand the floodplain corridor and provide other improvements to fish habitat that are being implemented in the Yuba-Feather-Bear River system, including the TRLIA Bear River levee setback project and potential future projects that may be developed through the Lower Yuba River Fisheries Technical Working Group. Overall, recent downward trends in fish populations appear to have reached alarmingly low levels. The Applicant Preferred Alternative could contribute to reversing this trend and, given the mitigation described in Section 3.8, could contribute to species recovery. Consequently, the Applicant Preferred Alternative would not contribute to a significant adverse cumulative effect related to fisheries.

### **Intermediate Setback Levee Alternative**

The Intermediate Setback Levee Alternative would affect a smaller land area than would be affected by the Applicant Preferred Alternative – ASB Setback Levee Alternative. Like the proposed levee setback, the intermediate levee setback would not result in a considerable contribution to any substantial cumulative adverse effect with the implementation of mitigation measures. The intermediate levee setback would result in a smaller setback area with less potentially available floodplain habitat than the proposed levee setback, resulting in a slightly reduced potential beneficial effect related to fisheries compared to the Applicant Preferred Alternative.

### **Levee Strengthening Alternative**

With implementation of mitigation, levee strengthening activities would not result in substantial adverse effects associated with sedimentation and contamination of waterways as described in Section 3.4, “Water Quality,” which subsequently would ensure that substantial adverse effects would not occur to fish habitat or fish populations as described in Section 3.8, “Fisheries.” In addition, other levee reconstruction and repair efforts conducted and planned for the Feather, Yuba, and Bear River levees by the Corps, TRLIA, and/or other agencies have been, and will be, required to incorporate similar mitigation measures to ensure the protection of water quality and fish habitat from potential sedimentation and effects of toxic spills, in accordance with existing regulations, including preparation and implementation of a SWPPP. For these reasons, levee strengthening activities would not make a cumulatively considerable contribution to any substantial adverse effect associated with sedimentation and introduction of toxic materials into fish habitat. Any direct effects of construction activities on overhead cover or woody material that could degrade fish habitat would be negligible, and any potential contribution to a cumulative effect on these habitat features would also be negligible.

### **No-Action Alternative**

Because only minor levee repairs or improvements (i.e., repairs not triggering NEPA, 408 authorization, or a CWA 404 individual permit) could be undertaken under the No-Action Alternative, this alternative would make no contributions to any beneficial cumulative effects associated with a setback levee.

## **4.2.4.5 TERRESTRIAL BIOLOGICAL RESOURCES**

### **Applicant Preferred Alternative – ASB Setback Levee Alternative**

As indicated in Section 3.7, “Terrestrial Biological Resources,” the Applicant Preferred Alternative – ASB Setback Levee Alternative would not result in substantial adverse effects, with no need for mitigation, for special-status bird species and Pacific western big-eared bat. The project would not provide a substantial contribution to any potentially significant cumulative impacts related to these resources.

Construction activities associated with the Applicant Preferred Alternative could have potential adverse effects on the following resources: jurisdictional waters of the United States (U.S.), special-status plants, valley elderberry



longhorn beetle, northwestern pond turtle, and giant garter snake. Mitigation included in Section 3.7 of this EIS and the Biological Assessment (BA) provided to the USFWS as part of the Section 7 ESA consultation would be implemented to address potential direct effects on these resources. With issuance of the final Biological Opinion (BO) by USFWS on August 28, 2008, Section 7 ESA consultation has been completed, and mitigation measures included in the BO would also be implemented. Consultation with the Corps has included preparation of a conceptual mitigation plan, which has been accepted by the Corps as providing appropriate compensation for the project's effects to waters of the U.S. Compensatory mitigation to offset permanent impacts to waters of the U.S. would consist of a combination of on-site mitigation in the impact area; habitat creation, restoration, and enhancement in other locations in the setback area; and preservation of this habitat in perpetuity. Surveys, maintenance of buffer areas where practicable, other avoidance measures, and compensation for unavoidable habitat losses described in the mitigation presented in Section 3.7 would ensure minimization of any potential temporary effects of construction on federally protected species that could be present on the project site: valley elderberry longhorn beetle, northwestern pond turtle, and giant garter snake.

Implementation of the Applicant Preferred Alternative has the potential to contribute considerably to a cumulative benefit to terrestrial biological resources through restoration actions that would enhance the riverine ecosystem along the Feather River. Restoration of wetlands, enhancement of floodway riparian communities, and restoration of other vegetation communities undertaken in portions of the levee setback area would result in regional benefits, including increasing the effective amount and complexity of habitat available to species and helping to reverse habitat fragmentation on a local level. These efforts, in combination with other restoration projects described above, would combine to enhance regional migratory corridors; provide larger and more complex habitat units for wildlife and species that require large home ranges; and provide greater opportunities for separate populations to interbreed, potentially increasing species' genetic diversity.

Most of the flood control projects included in the TRLIA flood control program, including the Applicant Preferred Alternative, address similar impacts on biological resources. Any of these projects, and any development projects, have been required to implement measures similar to those that would be undertaken for the Applicant Preferred Alternative to ensure minimization of, and compensation for, impacts on potentially affected species, most of which are protected by the ESA. As discussed above in Section 4.1.2, "Removing Obstacles to Growth—Flood Protection," planned development projects in the RD 784 area would mitigate all significant impacts on biological resources to less-than-significant levels. The East Linda Specific Plan EIR discussed the potential for project impacts on 2.5 acres of vernal pools and vernal pool habitat and described mitigation measures, including limiting cut and fill and limiting the area of heavy equipment operations to the immediate construction areas. The EIR concluded these measures would reduce these impacts to less-than-significant levels. However, as identified in the Yuba County General Plan EIR and applicable throughout the county, there are potential indirect adverse effects on biological resources that could occur via illegal hunting, domestic dog activity, off-road vehicle use, the use of pesticides and other harmful chemicals, and other factors related to more intense human presence and activity. A mitigation measure was provided to reduce this impact, but the general plan EIR indicated that this impact remains potentially significant.

Past and ongoing levee repair efforts being conducted by the Corps, TRLIA, and others have provided relatively large habitat restoration areas such as the Corps Marysville–Yuba City Mitigation Area and habitat restoration associated with the Bear River levee setback. These restoration areas provide a cumulative benefit to terrestrial biological resources that assist in compensating for any adverse cumulative impacts. It is expected that future projects, including development projects, would compensate for unavoidable impacts to endangered species through establishment of similar mitigation areas, or contributions to establishment of these areas, such as through purchases of credits in a mitigation bank. Through these compensation actions and other mitigation requirements, projects would be expected to have anywhere from a beneficial, to neutral, to slightly detrimental effect on terrestrial biological resources. Given the overall potential for both beneficial and adverse effects from past, present, and reasonably foreseeable future projects, and impact minimization and compensation requirements for individual projects, adverse cumulative effects on terrestrial biological resources would not occur. However, if

existing and current conditions were considered to result in a significant adverse cumulative effect, the Applicant Preferred Alternative would not make a substantial contribution to this effect.

### **Intermediate Setback Levee Alternative**

Under the Intermediate Setback Levee Alternative, the levee setback area would be somewhat smaller than under the Applicant Preferred Alternative – ASB Setback Levee Alternative because portions of the intermediate setback levee alignment are located farther to the west than the proposed setback levee alignment. Although the setback area would be smaller, effects on terrestrial biological resources would generally be considered similar to the Applicant Preferred Alternative. Therefore, the Intermediate Setback Levee Alternative would not result in a considerable contribution to any cumulative adverse effect on terrestrial biological resources.

### **Levee Strengthening Alternative**

As indicated in Section 3.7 “Terrestrial Biological Resources,” levee strengthening activities would have less-than-significant project-specific impacts with mitigation incorporated. Given the cumulative context regarding terrestrial biological resources described above for the Applicant Preferred Alternative – ASB Setback Levee Alternative, the Levee Strengthening Alternative would not result in a considerable contribution to any cumulative adverse effect on terrestrial biological resources. However, because the Levee Strengthening Alternative does not provide a setback area and associated habitat restoration opportunities, this alternative would not contribute to any beneficial cumulative effect related to habitat restoration activities implemented as part of various projects in the region.

### **No-Action Alternative**

Because only minor levee repairs or improvements (i.e., repairs not triggering NEPA, 408 authorization, or a CWA 404 individual permit) could be implemented under the No-Action Alternative, none of the contributions to beneficial cumulative effects described above for the setback levee alternatives would occur.

## **4.2.4.6 CULTURAL RESOURCES**

### **Applicant Preferred Alternative – ASB Setback Levee Alternative**

Archaeological site CA-Yub-5, a prehistoric village site, is the only known site potentially eligible for the National Register of Historic Places (NRHP) or California Register of Historic Resources (CRHR) in the area of potential effect (APE) for cultural resources. The original proposed setback levee alignment was moved several hundred feet east to avoid this site. Construction of the setback levee in its current alignment would not disturb site CA-Yub-5. Degradation of the existing levee after the setback levee is complete, and subsequent flooding of the setback area, could have a substantial adverse effect on CA-Yub-5 due to increased inundation frequency and saturation of soils on the site. Adverse effects could also occur if the site is exposed to erosive forces from flood flows. Mitigation Measures included in Section 3.10, “Cultural Resources,” of this EIS and resulting from consultation with the State Historic Preservation Officer (SHPO) as part of compliance with Section 106 of the National Historic Preservation Act (NHPA) would reduce adverse effects to CA-Yub-5 to below significance thresholds. Mitigation measures specified in the Historic Properties Treatment Plan (HPTP) submitted to the Corps on August 21, 2008, would also be implemented.

Undocumented and potentially significant cultural resources, including human remains, may be present in areas that were not available for cultural resources surveys at the time this EIS was prepared, and could also exist below the surface in areas that were surveyed. If unknown resources exist in these areas, they could be damaged by project-related ground disturbing activities. Mitigation is included in Section 3.10 of this EIS and as part of the Section 106 consultation that would reduce adverse effects associated with unknown cultural resources and human remains.

Implementing mitigation measures provided in Section 3.10 of this EIS and other plans prepared in compliance with Section 106 (i.e., the HPTP and the draft Cultural Resources Construction Monitoring and Inadvertent Discovery Plan) would ensure that construction under the Applicant Preferred Alternative – ASB Setback Levee Alternative would not incrementally contribute to any significant cumulative impacts on important cultural resources in the project region. These measures, some specific to site CA-Yub-5, are fairly standard to ensure compliance with various state and federal regulations, and similar measures have been applied to other flood protection projects in the region. Moreover, where federal agency approvals are required to implement projects, additional protection would also be anticipated under the NHPA, which is commonly implemented by federal agencies, making measures such as those described herein fairly standard as well. As described above in Section 4.1.2, “Removing Obstacles to Growth—Flood Protection,” planned development projects either would not have significant effects on cultural resources, or where significant effects might occur, mitigation measures (likely similar to those described for the Applicant Preferred Alternative) would be implemented to reduce these effects to less-than-significant levels. Given these conditions, no significant adverse cumulative impact related to cultural resources would occur.

For these reasons, the Applicant Preferred Alternative would not incrementally contribute to a substantial cumulative adverse effect related to cultural resources.

### **Intermediate Setback Levee Alternative**

The Intermediate Setback Levee Alternative would result in effects very similar to those described above for the Applicant Preferred Alternative – ASB Setback Levee Alternative. Both alignments avoid direct disturbance of site CA-Yub-5. Both alignments overlap in the vicinity of site CA-Yub-5; therefore, both alternatives would result in the placement of site CA-Yub-5 in the setback area. Both the Intermediate Setback Levee Alternative and the Applicant Preferred Alternative have unsurveyed areas, and both have the potential to disturb undiscovered cultural resources, including human remains. The levee setback area would be somewhat smaller under the Intermediate Setback Levee Alternative than under the Applicant Preferred Alternative because portions of the intermediate setback levee alignment are located farther to the west than the proposed setback levee alignment, resulting in less ground disturbance, and therefore less potential for disturbing unknown cultural resources. As indicated above under the Applicant Preferred Alternative, with implementation of mitigation, the Applicant Preferred Alternative would not result in a substantial contribution to a significant cumulative effect on cultural resources. The Intermediate Setback Levee Alternative would result in slightly less potential for adverse effects compared with the Applicant Preferred Alternative, due to less ground disturbance. Therefore, the Intermediate Setback Levee Alternative also would not result in a substantial contribution to a significant cumulative effect on cultural resources.

### **Levee Strengthening Alternative**

The Levee Strengthening Alternative would require less ground disturbance than the Applicant Preferred Alternative – ASB Setback Levee Alternative, with the majority of construction activities located within the existing levee easement and a few other associated areas. This results in less potential for disturbance of unknown archaeological resources than the Applicant Preferred Alternative, although the potential does exist for an adverse effect. In addition, no known cultural resources are located within the areas identified for disturbance under the Levee Strengthening Alternative. Site CA-Yub-5 would not be affected under this alternative. Overall, the Levee Strengthening Alternative would result in less direct adverse effects on cultural resources than the Applicant Preferred Alternative. Therefore, the Levee Strengthening Alternative also would not result in a substantial contribution to a significant cumulative effect on cultural resources.

### **No-Action Alternative**

The No-Action Alternative would only potentially involve limited construction activity that would not require federal authorization beyond a Clean Water Act Section 404 Nationwide Permit. Under these circumstances, any

levee maintenance/repair activities would be limited to existing disturbed areas and would be very unlikely to result in adverse effects to cultural resources that would contribute to a cumulative effect. Although damage to cultural resource sites could result from flooding in the event of a catastrophic levee failure under the No-Action Alternative, the magnitude of such an effect and its contribution to any cumulative impacts cannot be estimated.

#### **4.2.4.7 AIR QUALITY**

Virtually all pollutant emissions associated with the Applicant Preferred Alternative – ASB Setback Levee Alternative and other alternatives would be the result of construction-related activity; any operational emissions would be extremely minor and would not contribute measurably to cumulative air quality emissions. Therefore, this evaluation focuses on the pollutants of concern that would be associated with construction-related emissions: reactive organic gases (ROG), oxides of nitrogen (NO<sub>x</sub>), and particulate matter less than 10 microns in diameter (PM<sub>10</sub>).

As described previously in Section 3.11, “Air Quality,” the FRAQMD portion of the Northern Sacramento Valley Air Basin (NSVAB) is designated as a nonattainment area with respect to the state standards for ozone (1-hour) and PM<sub>10</sub>. Yuba and Sutter Counties are designated as a nonattainment area with respect to the state standards for ozone (1-hour) and PM<sub>10</sub>, and are either in attainment or unclassified for the remaining state standards. If state attainment standards are used as a significance criterion, the fact that the FRAQMD portion of the Northern Sacramento Valley Air Basin (NSVAB) and Yuba and Sutter Counties are in non-attainment for ozone and PM<sub>10</sub> is indicative of an existing significant adverse cumulative effect generated by past and existing projects in the air basin. The respective portions of Yuba and Sutter Counties where the proposed action is located are either in attainment or unclassified for federal standards. Both Yuba and Sutter counties are currently recommended for nonattainment for federal PM<sub>2.5</sub> air quality standards. These attainment/non-attainment conditions reflect existing conditions, and therefore, show the cumulative air quality impact of past and current/existing projects.

Any project that is constructed in the FRAQMD has the potential to add traffic and other pollution-emitting sources that would contribute to the cumulative degradation of air quality in the region. This is particularly true of large-scale housing and commercial developments, such as development of the Plumas Lake Specific Plan and East Linda Specific Plan areas. At the same time, vehicles throughout the region are continuously being modernized as consumers replace older vehicles, and the newer vehicles have improved air emission levels. California’s AB 32 requires statewide reductions in greenhouse gas reductions, which will secondarily result in reductions in pollutant emissions from mobile, stationary, and area wide sources. California is also pursuing legal remedies to receive authorization from EPA to increase fuel efficiency standards in the state. If this legal action is successful, mobile source emissions would be further reduced in the future. Furthermore, FRAQMD is required to make progress toward compliance with federal clean air standards. It can be assumed that policies and regulatory programs (requirements for best available control technology) will minimize air quality impacts over time. However, it cannot be stated with certainty that future air quality, with growth projected to occur throughout the region (see, “Population and Development Trends in the Yuba County Area,” above), will be better in the future than it is today.

Like the Applicant Preferred Alternative and other alternatives, past flood control projects in the RD 784 area implemented by TRLIA, the Corps, and others generate temporary air emissions during construction, but generate little to no long-term operational emissions. Therefore, emissions from the flood control projects listed above would interact only with other projects on a cumulative basis where emissions from other projects occur at the same time as construction of the flood control projects. The only planned flood control project that would occur concurrently with the Applicant Preferred Alternative is the FRLRP Segments 1 and 3 levee repairs. The only other emission sources that would interact with the Applicant Preferred Alternative on a cumulative basis are existing development projects that generate stationary (e.g., industrial facilities, dry cleaners) and mobile source (i.e., vehicles) emissions. It is generally these existing stationary and mobile emission sources (as well as other sources such as agricultural production) that result in the existing significant adverse cumulative air quality impact (e.g., ozone and PM<sub>10</sub> non-attainment) in the FRAQMD area.

Because of the nature of conditions that affect air quality, impacts on air quality are considered on a regional basis; in the case of the project area, this region covers at least Yuba County and Sutter County, which are under FRAQMD jurisdiction. It is neither practical nor reasonable to consider a complete list of all projects that would affect this large region. Rather, attainment plans form the basis of projecting and resolving adverse air quality conditions throughout the region.

However, similar to the emission analysis described above in Section 4.1.2.9, “Air Quality,” where air emissions from a “Growth Inducing Development Scenario” were calculated, emissions have also been calculated for a “Cumulative Development Scenario” in the RD 784 area. The “Growth Inducing Development Scenario” analyzed previously in Section 4.1.2.9 looked at planned development in the area protected from flooding by the FRLRP Segment 2 levee. This development includes the Plumas Lake Specific Plan, the Bear River amendment to the Plumas Lake Specific Plan, the Country Club Estates project, and the western portion of the North Arboga Study Area. Emission calculations were conducted for a development scenario encompassing full buildout of all of these projects (with only the portion of the North Arboga Study Area in the flood protected area included in the analysis). The “Cumulative Development Scenario” consists of these same developments, but also includes remaining planned development in the RD 784 area, consisting of East Linda Specific Plan, the Woodbury Specific Plan, and the portion of the North Arboga Study Area outside the FRLRP Segment 2 levee flood protected area (see Figures 4-1 and 4-2).

The same methods described in Section 4.1.2.9 to calculate air emissions under the “Growth Inducing Development Scenario” were also applied to the “Cumulative Development Scenario.” Details on the assumptions entered into, and the outputs from the URBEMIS air emissions computer model are included in Appendix I of this FEIS. For the same reasons described in Section 4.1.2.9, model outputs are based on a variety of “worst-case scenario” assumptions and are expected to exceed actual air emissions from planned development in the RD 784 area. The modeling assumes construction would be initiated in 2009 and would proceed at a relatively even pace through full buildout, assumed to occur in 2030. The model does not account for reductions in construction equipment, vehicle, and area source emissions that would be assumed to occur in the future, as described above. This is another mechanism by which the modeling reflects a worst-case emission scenario.

The modeling results indicate that under the worse emission conditions, where construction of development under this “Cumulative Development Scenario” is underway and buildout is almost complete (i.e., maximum combined construction and operational emissions), planned development in the RD 784 area would generate 880 tpy of ROG, 645 tpy of NO<sub>x</sub>, 2,049 tpy of PM<sub>10</sub>, and 390 tpy of PM<sub>2.5</sub>. In the unit of lbs/day, emissions would be 13,713 lbs/day of ROG, 3,786 lbs/day of NO<sub>x</sub>, 13,219 lbs/day of PM<sub>10</sub>, and 2,563 lbs/day of PM<sub>2.5</sub>. Again, it should be noted that these are worst-case emissions. Early in project development operational emissions would be less, and after construction is complete this activity would not contribute to air emissions. Also, as stated previously, for several reasons the model outputs overestimate emission levels that would likely occur. However, even under these circumstances, emissions from planned development in the RD 784 area would make it more difficult for Yuba County to achieve attainment for the state ozone and PM<sub>10</sub> standards and could result in a substantial contribution toward nonattainment for federal PM<sub>10</sub> and/or PM<sub>2.5</sub> standards.

### **Applicant Preferred Alternative – ASB Setback Levee Alternative**

Fugitive dust and mobile-source emissions (such as motor vehicle exhaust) would be generated by various construction activities, including equipment operation at the construction sites, construction personnel commute trips, the delivery of equipment and materials to the construction areas, and ground disturbance during construction and excavation. Mobile-source emissions contain criteria pollutants, including ozone precursors (ROG and NO<sub>x</sub>) and fine particulate matter (PM<sub>10</sub>); however, fugitive dust would be considered the primary source of PM<sub>10</sub>.

Consistent with guidance for calculating emissions to determine exceedance of the general conformity thresholds, emissions were calculated assuming the implementation of the FRAQMD’s standard mitigation measures (listed

previously in Section 3.11.3 in Section 3.11, “Air Quality”). Implementing these measures is expected to achieve a 75% reduction in fugitive dust emissions, 5% reduction in ROG emissions from construction equipment, 20% reduction in NO<sub>x</sub> emissions from construction equipment, and 45% reduction in PM<sub>10</sub> emissions from construction equipment (Sacramento Metropolitan Air Quality Management District 2004). The resulting maximum average annual emissions are calculated to be 12 tons/year of ROG, 49 tons/year of NO<sub>x</sub>, and 80 tons/year of PM<sub>10</sub> during project construction. Mitigated emissions of ROG, NO<sub>x</sub>, and PM<sub>10</sub> fall below the applicable EPA de minimis thresholds. When emissions are calculated on a daily basis, consistent with FRAQMD-suggested significance thresholds for analysis under CEQA, maximum emissions after mitigation are calculated to be 97 lb/day ROG, 422 lb/day NO<sub>x</sub>, and 1,005 lb/day PM<sub>10</sub>. These mitigated daily emissions of ROG, NO<sub>x</sub>, and PM<sub>10</sub> would still exceed the FRAQMD-recommended CEQA maximum daily emissions thresholds of 25 lb/day of ROG and NO<sub>x</sub> and 80 lb/day of PM<sub>10</sub>. Because of the large size of the project and high activity level with construction activities to be conducted concurrently at multiple locations, as well as the nonattainment status of the project area, and based on the modeling conducted, construction-generated emissions under the Applicant Preferred Alternative – ASB Setback Levee Alternative are considered a substantial contribution to an existing significant cumulative adverse air quality effect. These effects would occur during project construction and would be temporary.

Although emissions generated by the Applicant Preferred Alternative, along with those of other proposed and planned projects within the NSVAB, may contribute to localized violations of individual air quality standards, a definitive determination of whether a change in attainment status would result for the whole air basin for a particular criteria air pollutant would be speculative. However, as stated above regarding the estimate of cumulative emissions from planned development in the RD 784 area, emissions from this development would make it more difficult for Yuba County to achieve attainment for the state ozone and PM<sub>10</sub> standards and could result in a substantial contribution toward nonattainment for federal PM<sub>10</sub> and/or PM<sub>2.5</sub> standards. It is worth noting that because emissions generated by the Applicant Preferred Alternative were estimated to fall below the general conformity de minimis thresholds, which are tied to attainment planning, the project would not substantially conflict with current federal air quality planning efforts.

### **Intermediate Setback Levee Alternative**

The construction program under the Intermediate Setback Levee Alternative would generally be the same as described above for the Applicant Preferred Alternative – ASB Setback Levee Alternative. Although locations of some project elements would differ, methods of constructing the slurry cutoff wall, foundation preparation, levee embankment construction, utility relocation, removal of the existing levee, relocation of Pump Station No. 3, and other construction elements would be the same. The Intermediate Setback Levee Alternative would follow the same construction schedule as the Applicant Preferred Alternative. Like the Applicant Preferred Alternative, it is estimated that under the Intermediate Setback Levee Alternative, approximately 3.6 million cu. yd. of material would be required for setback levee construction. Although the length of the Intermediate Setback Levee is approximately 0.2 mile less than the Applicant Preferred Alternative, the existing ground surface is at a lower elevation along much of the Intermediate Setback Levee Alignment. Therefore, more soil is needed to build a levee to the desired height, resulting in the same borrow material needs for both alternatives. Potential borrow areas would be the same as described above for the Applicant Preferred Alternative and would be treated in the same manner. The process for removal of the existing levee would be the same for both alternatives. Operation and maintenance of the setback levee and the levee setback area would also be the same as described for the Applicant Preferred Alternative.

Because the construction program, schedule, and intensity under the Intermediate Setback Levee Alternative would be very similar to the Applicant Preferred Alternative, the adverse effects to air quality would, likewise, be very similar, including cumulative effects. Therefore, like the Applicant Preferred Alternative, the Intermediate Setback Levee Alternative would result in a substantial contribution to an existing significant cumulative adverse air quality effect. Also like the Applicant Preferred Alternative, although emissions generated by the Intermediate Setback Levee Alternative, along with those of other proposed and planned projects within the NSVAB, may



contribute to localized violations of individual air quality standards, a definitive determination of whether a change in attainment status would result for the whole air basin for a particular criteria air pollutants would be speculative. It is worth noting that because emissions generated by the Intermediate Setback Levee Alternative would fall below the general conformity de minimis thresholds, which are tied to attainment planning, the project would not substantially conflict with current federal air quality planning efforts.

### **Levee Strengthening Alternative**

The Levee Strengthening Alternative would involve repairs and improvements to the existing Feather River levee along Segment 2. No setback levee would be constructed. Repairs and improvements would consist of construction of slurry walls, installation of relief wells, raising and/or constructing seepage/stability berms at various locations, and correcting identified waterside erosion problem areas. Under this alternative, the existing Pump Station No. 3 would be removed and a new pump station would be installed farther east of the existing site. Soil borrow areas would be established of sufficient size to support levee repairs. A construction period of about 8 months, beginning in the first spring after detailed designs are completed, is assumed for levee repair and strengthening in project Segment 2 if this alternative is selected. The equipment list of the Levee Strengthening Alternative is fairly similar to that of the Applicant Preferred Alternative – ASB Setback Levee Alternative.

Requirements for borrow material would be substantially less under the Levee Strengthening Alternative than alternatives incorporating a setback levee because the existing levee would be retained and soil for a setback levee would not be necessary. In addition, material excavated from the slurry cutoff wall trenches would be used to the extent practicable, reducing the need for borrow material from off-site sources. However, it is still estimated that a total of approximately 1.4 million cu. yd. of borrow material would be required for levee repair and strengthening activities.

The Levee Strengthening Alternative would disturb a substantial amount of soil and would require approximately 1.4 million cu. yd. of borrow material. However, because this alternative would utilize much of the levee's existing materials and not include other major soil-moving activities included in the Applicant Preferred Alternative, such as removing the existing levee, the amount of soil disturbance would be considerably less under the Levee Strengthening Alternative. Consequently, emissions from construction equipment and fugitive dust emissions would be fewer, and like the Applicant Preferred Alternative, would not exceed EPA emission thresholds described above. However, emissions from the Levee Strengthening Alternative would still exceed FRAQMD suggested thresholds (See Section 3.11, "Air Quality"). Therefore, although emissions would be less than the Applicant Preferred Alternative, because of the relatively large disturbance area and volume of soil to be moved under the Levee Strengthening Alternative, as well as the nonattainment status of the project area, construction-generated emissions under this alternative are considered a substantial contribution to an existing significant cumulative adverse air quality effect. Issues related to the Levee Strengthening Alternative and other proposed and planned projects within the NSVAB potentially affecting the attainment status of the air basin are the same as described above for the Applicant Preferred Alternative and the Intermediate Setback Levee Alternative.

### **No-Action Alternative**

There would be only minimal construction emissions under the No-Action Alternative, and this alternative would not make a substantial contribution to a significant cumulative impact on air quality. Without repair of the FRLRP Segment 2 levee it is unlikely that development in the flood protected area would proceed as currently planned. Therefore, cumulative emissions from construction and operation of development in the flood protected area would be substantially less than under the action alternatives described above.

#### 4.2.4.8 NOISE AND VIBRATION

The discussion of cumulative noise effects is focused on the areas where construction noise from the Applicant Preferred Alternative – ASB Setback Levee Alternative and other alternatives could combine with noise from other projects and exceed established thresholds for sensitive receptors. For noise from the Applicant Preferred Alternative and other alternatives to interact with other projects on a cumulative basis, noise generated by these alternatives must occur at the same time and at a location a similar distance from receptors as noise generated by other projects.

##### **Applicant Preferred Alternative – ASB Setback Levee Alternative**

Almost all noise that would be associated with the Applicant Preferred Alternative – ASB Setback Levee Alternative would be generated by construction activities and, therefore, would be short term. The only operational activities that would be associated with the Applicant Preferred Alternative would be periodic maintenance activities at the setback levee similar to those currently being performed at the existing Feather River levee and operation of pumps within the concrete structure at the new Pump Station No. 3. Neither of these activities would noticeably increase ambient noise levels at sensitive receptors.

It is possible that the simultaneous operation of the on-site construction equipment associated with the Applicant Preferred Alternative could result in combined intermittent noise levels of as high as 104 A-weighted decibels (dBA) at 50 feet from the proposed alignment. Exterior noise levels approximately 100 feet from the part of the existing or setback levee alignment where construction is occurring could be as high as 98 dBA without the use of feasible noise control, and noise levels 200 feet from the construction area could be as high as 92 dBA. Noise levels in areas within about 6,500 feet of the existing or setback levee alignment could exceed 60 dBA, without feasible noise control, as a result of construction activity. The setback levee alignment is within several hundred feet of some residences and other noise sensitive receptors (see Section 3.12, “Noise and Vibration”).

Noise is a localized occurrence and attenuates with distance. Therefore, only future projects in the vicinity of the Applicant Preferred Alternative would have the potential to add to anticipated project-generated noise, thus resulting in cumulative noise impacts. Segments 1 and 3 of the FRLRP are included in the cumulative analysis and are located directly north and south of the Applicant Preferred Alternative. It is possible that construction activities from Segments 1 and 3 could overlap in time with the Applicant Preferred Alternative. However, due to the linear nature of these levee improvements, which spreads construction activities over miles, the construction-related noise generated from these projects would likely only interact for a short time, if at all. Other projects considered in this cumulative analysis that have the potential to be under construction concurrently with the Applicant Preferred Alternative are located a considerable distance from the site. The closest of these is the Plumas Lake Specific Plan area, which, at its nearest points, is located over 2,000 feet east of the project site. However, if construction activities associated with the Applicant Preferred Alternative and the Plumas Lake Specific Plan were to occur concurrently, it is possible that construction noise associated with these projects together could combine to result in greater noise levels at some of the dispersed sensitive noise receptors in the area than noise levels from each project alone.

Although construction noise generated by the Applicant Preferred Alternative and other project may interact, the question is whether the noise from these combined sources would, together, cause a substantial increase in noise levels above ambient levels for sensitive receptors or would exceed a local noise ordinance. As discussed in Section 3.12, “Noise and Vibration,” construction noise would be temporary and intermittent, and in the case of the FRLRP Segments 1, 2, and 3 work, would move along the construction alignment over time. Overall, any single sensitive receptor would be exposed to construction noise for relatively short periods, even when considering the Segments 1, 2, and 3 work and the Plumas Lake Specific Plan project together. Due to the short-term and temporary nature of construction noise, although construction activities may be heard temporarily at a sensitive receptor, this is not considered to result in a substantial increase in noise levels above ambient levels.

The Yuba County noise ordinance prohibits the generation of construction noise “between the hours of 10:00 p.m. of one day and 7:00 a.m. of the following day in such a manner that a reasonable person of normal sensitiveness residing in the area is caused discomfort or annoyance unless a permit has been duly obtained beforehand from the Director of the Planning and Building Services Department as set forth in Section 8.20.710 of the Noise Ordinance.” TRLIA will ensure these requirements are adhered to for the FRLRP Segments 1, 2, and 3 work. If nighttime work is required, TRLIA will not initiate such work until a permit has been obtained consistent with the noise ordinance requirements. Therefore, the Applicant Preferred Alternative would not result in an exceedance of a local noise ordinance. Any interaction with noise generated by other projects (e.g., the Plumas Lake Specific Plan work) would not change this conclusion.

Given these circumstances, a significant adverse cumulative affect related to noise would not occur, and the Applicant Preferred Alternative would not make a substantial contribution to any significant adverse cumulative effect.

The Applicant Preferred Alternative would not result in a significant impact related to generation of groundborne vibration during construction (see Section 3.12, “Noise and Vibration”). Groundborne vibration attenuates rapidly with distance and projects must be in close proximity to each other (within the range of approximately 100 feet, depending on the type of equipment generating the vibration) to simultaneously contribute to vibration levels at the same location. There are no opportunities for projects addressed in this cumulative analysis to interact with the Applicant Preferred Alternative in regard to groundborne vibration, and no cumulative impact would occur.

### **Intermediate Setback Levee Alternative**

The Intermediate Setback Levee Alternative would include a similar construction program as described above for the Applicant Preferred Alternative – ASB Setback Levee Alternative, with minor differences in location of some of the construction activities. Of significance to this analysis is that the location of the northern portion of the levee alignment is farther to the west and, therefore, farther from noise sensitive land uses in the vicinity. As indicated above, the Applicant Preferred Alternative would not result in a substantial contribution to a significant adverse cumulative effect related to noise or vibration. The Intermediate Setback Levee Alternative would result in slightly less potential for adverse effects compared with the Applicant Preferred Alternative due to the increased distance from sensitive noise receptors. Therefore, the Intermediate Setback Levee Alternative also would not result in a substantial contribution to a significant cumulative effect related to noise and vibration.

### **Levee Strengthening Alternative**

The Levee Strengthening Alternative would require construction equipment similar to the Applicant Preferred Alternative – ASB Setback Levee Alternative. However, unlike the Applicant Preferred Alternative, the Levee Strengthening Alternative would not include construction of a setback levee. Consequently, the construction activities would be farther from sensitive receptors east of the proposed setback levee alignment, and would result in less perceptible short term noise impacts at these sensitive receptors. However, the six residential dwelling units proposed for removal by the Applicant Preferred Alternative would not be removed under the Levee Strengthening Alternative; therefore, construction noise generated by the Levee Strengthening Alternative would affect six sensitive receptors currently located in the vicinity of the existing levee. For this reason, the Levee Strengthening Alternative would result in similar noise impacts as the Applicant Preferred Alternative, although it should be noted that the construction period for the Levee Strengthening Alternative would be much shorter. For the same reasons described above for the Applicant Preferred Alternative, the Levee Strengthening Alternative would not result in a substantial contribution to a significant cumulative effect related to noise and vibration.

## **No-Action Alternative**

Because there would be only minor construction activity (i.e., activity not triggering NEPA, 408 authorization, or a CWA 404 individual permit) under the No-Action Alternative, this alternative would not make a substantial contribution to cumulative noise effects.

### **4.2.4.9 TRANSPORTATION AND CIRCULATION**

The discussion of cumulative traffic effects is focused on the areas where construction generated traffic from the Applicant Preferred Alternative – ASB Setback Levee Alternative and other alternatives could combine with traffic from other projects and exceed established thresholds. For traffic generated by the Applicant Preferred Alternative and other alternatives to interact with other projects on a cumulative basis, traffic generated by the Applicant Preferred Alternative and other alternatives must occur at the same time and at the same location as traffic generated by other projects.

#### **Applicant Preferred Alternative – ASB Setback Levee Alternative**

Construction of the Applicant Preferred Alternative – ASB Setback Levee Alternative would have only a temporary effect on traffic. For the initial screening of temporary project effects on traffic, the Institute of Transportation Engineers (ITE) recommends that an impact be examined further when it involves an increase of 50 or more trucks, 100 passenger vehicles, or an equivalent combination of vehicles per hour in the peak direction during the peak hour at any roadway intersection (Institute of Transportation Engineers 1989).

Combining the truck trips originating from outside the construction area and those within the construction area (occurring outside the setback area), the Applicant Preferred Alternative would place approximately 240 truck trips per day on local roadways (see Section 3.13, “Transportation and Circulation” for further discussion of this result). These trips would be spread out over the work day and would also be spread geographically, as work would occur simultaneously in several locations along the 5.7-mile-long project alignment. For these reasons, truck traffic would not exceed the ITE threshold of 50 trucks per hour in a peak hour in a peak direction at a single intersection.

The construction labor force is estimated to average about 60–70 persons over the 20-month construction period. Peak staffing could be close to 100 depending on the contractor’s schedule. Members of the construction crew are expected to travel to the project area from different directions, with overall traffic spread among various roadways and intersections, and it is also likely that some ridesharing would take place. Therefore, although construction staff traffic could potentially generate 100 commute trips during peak construction periods, commute traffic is not expected to exceed the ITE threshold of an increase in traffic volume of 100 vehicles in the peak direction during the peak hour at any individual intersection.

During the approximately 20-month construction period under the Applicant Preferred Alternative, commute trips and truck haul trips would increase traffic on Feather River Boulevard, SR 70, and local roadways. However, the construction-related trips would not exceed the thresholds established by ITE at any time or substantially increase overall traffic levels on the local road system.

Almost all projects listed above in Section 4.2.3, “Past, Present, and Future Projects,” would not interact with traffic generated by the Applicant Preferred Alternative, either because they are too distant and would not generate vehicle trips on the same roadways, because the projects are complete and do not generate traffic after completion (i.e., flood control projects), or the projects are in the planning stages and the Applicant Preferred Alternative would be completed before the project is initiated and generates vehicle trips. Exceptions would be the FRLRP Segments 1 and 3 work and the continuing development associated with the Plumas Lake Specific Plan. A large majority of the traffic generated by each of these projects would be confined to a limited area, typically in close proximity to each project site, and traffic generated by each project would not interact. Where

traffic from these projects might utilize the same roadways simultaneously is along Feather River Boulevard and SR 70. It is possible that trips generated by material deliveries, employee commute trips, residential commute trips, and general construction operations could all interact along portions of these roadways. However, trips associated with these activities make up only a portion of the overall trips for each project. Of these trip generating categories, only a portion of the Segments 1 and 3 trips would utilize portions of Feather River Boulevard also used during the Applicant Preferred Alternative, and vice versa. Similarly, although vehicles associated with each project would at some time utilize the same segments of SR 70, only a small portion of each project's overall vehicle trips would use these segments at the same time.

Among the Applicant Preferred Alternative, the Segments 1 and 3 work, and ongoing Plumas Lake Specific Plan development through 2009 (scheduled end of construction for the Applicant Preferred Alternative), the Applicant Preferred Alternative would have the greatest activity and generate the most trips. As stated above, the entirety of on-road trips generated by the Applicant Preferred Alternative would not exceed the ITE threshold of adding 50 or more trucks, 100 passenger vehicles, or an equivalent combination of vehicles per hour in the peak direction during the peak hour at any roadway intersection. Intersections and roadway segments where vehicle trips generated by the Applicant Preferred Alternative might interact with trips generated by the Segments 1 and 3 work and the Plumas Lake Specific Plan would only be exposed to a small fraction of the total project vehicle trips. These same intersections and roadway segments would also only be exposed to a fraction of the trips generated by the other projects. Given the limited number of trips each project would contribute to a particular intersection or roadway segment where each project's traffic would interact, the cumulative trips generated by the Applicant Preferred Alternative, Segments 1 and 3 work, and Plumas Lake Specific Plan development would not exceed the ITE thresholds and would not result in a significant adverse cumulative traffic impact.

### **Intermediate Setback Levee Alternative**

The Intermediate Setback Levee Alternative would include a similar construction program as described above for the Applicant Preferred Alternative – ASB Setback Levee Alternative, with minor differences in location of some of the construction activities. The same roadways would be used for construction access. Like the Applicant Preferred Alternative, it is estimated that under the Intermediate Setback Levee Alternative, approximately 3.6 million cu. yd. of material would be required for setback levee construction. Potential borrow areas would be the same as described above for the Applicant Preferred Alternative and would be treated in the same manner. Therefore, because the construction program, schedule, and methods for the Intermediate Setback Levee Alternative would be very similar to the Applicant Preferred Alternative, the adverse effects associated with traffic would likewise be very similar. Therefore, as described above for the Applicant Preferred Alternative, the Intermediate Setback Levee Alternative, in conjunction with other local projects that would generate vehicle trips on same intersections and roadway segments, would not result in a significant adverse cumulative traffic impact.

### **Levee Strengthening Alternative**

Although differences in construction methods under the Levee Strengthening Alternative would result in some differences in vehicle trip generation rates relative to the Applicant Preferred Alternative – ASB Setback Levee Alternative (e.g., shorter construction period, less borrow material volume required), the Levee Strengthening Alternative also does not result in exceedances of the ITE traffic volume thresholds. Given the trip generation associated with the Levee Strengthening Alternative, this alternative, like the Applicant Preferred Alternative, would not interact with other local projects that would generate vehicle trips on same intersections and roadway segments in a manner that would result in a significant adverse cumulative traffic impact.

### **No-Action Alternative**

The No-Action Alternative would involve only minor construction activity (i.e., actions that do not trigger NEPA, 408 authorization, or a CWA 404 individual permit), which would not generate sufficient traffic to make a substantial contribution to any potential cumulative traffic impact. Although traffic disruption could result from

flooding in the event of a catastrophic levee failure under the No-Action Alternative, such an effect would be temporary and the magnitude of such an effect and its contribution to any significant cumulative impacts cannot be estimated.

#### **4.2.4.10 PUBLIC SERVICES, UTILITIES, AND SERVICE SYSTEMS**

##### **Applicant Preferred Alternative – ASB Setback Levee Alternative**

Although extensive work has been conducted to determine the locations of public utility infrastructure in the project area, and various utility surveys have been conducted, the potential exists for additional buried infrastructure elements that have not already been identified to be located near or crossing the levee. Construction activities could cause minor accidental damage to both identified and unidentified utility infrastructure, resulting in temporary disruptions to service. However, detailed design of the Applicant Preferred Alternative – ASB Setback Levee Alternative includes consultation with all known potential service providers to identify infrastructure locations and appropriate protection measures, and consultation would continue during construction to ensure avoidance/protection of facilities as construction proceeds. In addition, mitigation described in Section 3.14, “Public Services, Utilities, and Service Systems,” would further reduce potential adverse effects related to public utility infrastructure and utility service disruptions. Therefore, the potential for accidental damage to utility infrastructure during construction is remote, and if damage were to occur, disruptions to service would be short term and temporary until repairs were completed. Implementation of the Applicant Preferred Alternative would not result in substantial interference with utility infrastructure and services. Similar precautions would be expected to be taken during construction of other projects considered in this cumulative analysis, with a similar low likelihood of disruptions to service, and any disruptions, if they were to occur, would be short term and temporary. Therefore, no significant cumulative impact related to disruptions of utility service during construction is expected to occur. Even if such a cumulative impact were significant, the Applicant Preferred Alternative would not contribute substantially to the impact.

Increased traffic on Feather River Boulevard associated with construction of the Applicant Preferred Alternative could increase emergency response times and otherwise make access to the area more difficult for emergency service providers. Mitigation described in Section 3.14, “Public Services, Utilities, and Service Systems,” would ensure avoidance of this potential impact, and levee repairs and strengthening would not make a considerable contribution to any potential cumulative impacts related to emergency access.

##### **Intermediate Setback Levee Alternative**

Effects on public services, utilities, and service systems resulting from the Intermediate Setback Levee Alternative would be similar to the Applicant Preferred Alternative – ASB Setback Levee Alternative; however, the extent of affected utilities would be somewhat less under the Intermediate Setback Levee Alternative because the levee alignment is located farther to the west, resulting in a smaller setback area and effects on fewer facilities. For the reasons described above under the Applicant Preferred Alternative, the Intermediate Setback Levee Alternative would not contribute to any potential significant cumulative impacts on public services, utilities, and service systems.

##### **Levee Strengthening Alternative**

Under the Levee Strengthening Alternative work would be concentrated along the existing levee alignment and immediate vicinity. This alternative would have less potential than the Applicant Preferred Alternative – ASB Setback Levee Alternative or the Intermediate Setback Levee Alternative to affect public services, utilities, and service systems. For the reasons described above under the Applicant Preferred Alternative, the Levee Strengthening Alternative would not contribute to any potential significant cumulative impacts on public services, utilities, and service systems.

## **No-Action Alternative**

The No-Action Alternative would involve only minor construction activity (i.e., actions that do not trigger NEPA, 408 authorization, or a CWA 404 individual permit) and therefore would not make a substantial contribution to a cumulative impact on public services, utilities, and service systems.

### **4.2.4.11 PALEONTOLOGICAL RESOURCES**

#### **Applicant Preferred Alternative – ASB Setback Levee Alternative**

Based on the records search conducted at the University of California Museum of Paleontology (UCMP), there are no previously recorded fossil sites within the project area. There are no records that significant paleontological resources have been encountered in the project area, either through intentional study or accidentally during excavations for construction or other purposes. Therefore, there is no evidence that a significant adverse cumulative impact has occurred, or is occurring, in the project area relative to paleontological resources.

Paleontological resources would not be present in the sediments contained within and adjacent to the existing levee; therefore, removal of the existing levee would result in no impacts on paleontological resources. However, construction of the proposed setback levee in Segment 2 and related activities (e.g., use of the soil borrow area) have the potential to encounter and possibly damage unknown paleontological resources which may occur in the Modesto Formation soils. If any previously undiscovered paleontological resources are found as a result of construction activities, mitigation described in Section 3.15, “Paleontological Resources,” would be initiated to prevent any significant impacts on paleontological resources from occurring. Therefore, implementation of Applicant Preferred Alternative – ASB Setback Levee Alternative would not result in the current absence of a significant adverse cumulative impact on paleontological resources becoming a significant adverse cumulative impact.

In addition, a potential cumulative net benefit on paleontological resources in the region could occur because construction activity may encounter resources that would otherwise go undiscovered. The protection of those resources would allow future study that would contribute to the body of scientific knowledge.

#### **Intermediate Setback Levee Alternative**

The northern portion of the setback levee alignment under the Intermediate Setback Levee Alternative would be located on more Holocene Alluvium and less Modesto Formation than under the Applicant Preferred Alternative – ASB Setback Levee Alternative. Because the Modesto Formation is a more paleontologically sensitive formation, the Intermediate Setback Levee Alternative would have similar, but slightly less potential for adverse effects on paleontological resources and would therefore also not contribute to or result in a potential cumulative adverse effect. The same potential cumulative net benefit described for the Applicant Preferred Alternative would also occur.

#### **Levee Strengthening Alternative**

Ground disturbing construction activities associated with this alternative would be less than under the Applicant Preferred Alternative – ASB Setback Levee Alternative and would be primarily located within the existing levee easement and other associated areas. Most of these activities would be located on Holocene Alluvium deposits with no potential to contain significant paleontological resources. The Levee Strengthening Alternative would result in less potential for a substantial adverse effect than the Applicant Preferred Alternative and would not contribute to or result in a potential cumulative adverse effect on paleontological resources. The same potential cumulative net benefit described for the Applicant Preferred Alternative would also occur, although the potential to encounter paleontological resources that would provide valuable data would be less because of the smaller disturbance area under the Levee Strengthening Alternative.



## **No-Action Alternative**

The No-Action Alternative would involve only minor construction activity (i.e., actions that do not trigger NEPA, 408 authorization, or a CWA 404 individual permit) and therefore would not make a substantial contribution to a cumulative impact on paleontological resources.

### **4.2.4.12 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE**

#### **Applicant Preferred Alternative – ASB Setback Levee Alternative**

Because the five residences to be removed under the Applicant Preferred Alternative – ASB Setback Levee Alternative are not considered a low-income community and are not occupied by minority groups, and relocations would be subject to the Uniform Relocation Act and the California Relocation Assistance Law, relocation of residents implemented as part of the Applicant Preferred Alternative would not result in high and adverse socioeconomic effects, and any effects that did occur would not disproportionately affect a minority or low-income population (see Section 3.16, “Socioeconomics and Environmental Justice”).

In addition, although implementation of the Applicant Preferred Alternative would permanently remove up to approximately 800 acres of agricultural land from production, which could result in the loss of several agricultural related jobs, this would affect less than 0.5% of the total agricultural land in Yuba County. In addition, eligible farm operations would receive relocation assistance consistent with the Federal Uniform Relocation Act and the California Relocation Assistance Law. The Applicant Preferred Alternative would not result in a high and adverse socioeconomic effect related to the loss of agricultural jobs, and any impact that did occur would not disproportionately affect a minority or low-income population.

As indicated above in Section 4.2.2, “Population and Development Trends in the Yuba County Area” and Section 4.2.3, “Past, Present, and Future Projects,” there is an expansion of urban development in the county which is resulting in the conversion of agricultural land to development in various area. The number and extent of future development projects indicate this trend will continue well into the future. It is unknown whether any of the existing and future projects described in Section 4.2.3 will result in a high and adverse socioeconomic effect on a particular low-income or minority community. It is reasonable to assume that some jobs in the agricultural industry will be lost due to the conversion of agricultural land to development. However, some development will generate new jobs in various employment sectors (service sector, retail, construction, education). Therefore, it is also unknown whether the loss of agricultural jobs would ultimately result in a high and adverse socioeconomic effect. Even if the past, present, and future projects listed in Section 4.2.3 were to result in a significant and adverse cumulative effect related to socioeconomics and environmental justice, as described above and in Section 3.16, “Socioeconomics and Environmental Justice,” the Applicant Preferred Alternative would not make a substantial contribution to this effect.

It should also be noted that the flood protection benefits provided to the RD 784 area from past flood control improvements and the proposed FRLRP Segment 2 work (for any action alternative) would benefit a wide range of income and ethnic classifications, ranging from low-income residents in areas just south of Olivehurst, to owners of single-family residences in the Plumas Lake Specific Plan area, to landowners with large agricultural landholdings. Therefore, the benefits would not be disproportionately high or low for any income group or ethnic classification.

#### **Intermediate Setback Levee Alternative**

The Intermediate Setback Levee Alternative would result in the displacement of two fewer residences than under the Applicant Preferred Alternative – ASB Setback Levee Alternative. In addition, the Intermediate Setback Levee Alternative would result in the conversion of less farmland than the Applicant Preferred Alternative, and would subsequently result in the loss of fewer agricultural-related jobs. Therefore, like the Applicant Preferred

Alternative, implementation of the Intermediate Setback Levee Alternative would not result in a substantial contribution to any adverse cumulative effect related to socioeconomics and environmental justice, if such an adverse cumulative effect were to occur.

### **Levee Strengthening Alternative**

Under the Levee Strengthening Alternative, no residences would be removed from the levee setback area and consequently no occupants would be displaced. Implementation of this alternative would result in the removal of up to approximately 25 acres agricultural land from production. Therefore, like the Applicant Preferred Alternative – ASB Setback Levee Alternative, implementation of the Levee Strengthening Alternative would not result in a substantial contribution to any adverse cumulative effect related to socioeconomics and environmental justice, if such an adverse cumulative effect were to occur.

### **No-Action Alternative**

The No-Action Alternative would involve only minor construction activity (i.e., actions that do not trigger NEPA, 408 authorization, or a CWA 404 individual permit) and therefore would not make a substantial contribution to any known socioeconomic impact. Because sufficient repairs to the Segment 2 levee to achieve desired flood protection levels could not be completed under the No-Action Alternative, flood control benefits in the Segment 2 flood protected area would not occur for the wide range of income and ethnic classifications in the area.

## **4.3 GLOBAL CLIMATE CHANGE**

There is an existing and growing consensus in the scientific community that the average global temperature has risen over the last 100 years and that human influence is likely a significant factor in that change. This global increase in average temperature (global warming) can lead to global, regional, and local changes in climatic conditions (global climate change). Although there is a great deal of consensus regarding the occurrence of global warming/global climate change and the mechanisms contributing to it, there remains varying levels of uncertainty regarding a number of related topics, such as the rate of warming, how the warming has translated into altered climate conditions, and what future trends and conditions may exist.

A simple rise in annual average temperature would have little to no effect on the implementation and operation of the Applicant Preferred Alternative – ASB Setback Levee Alternative and other alternatives. However, regional changes in climatic conditions influenced by global warming, such as changes in the timing or volume of precipitation, could have a direct effect on the function of flood control projects such as the Applicant Preferred Alternative and other alternatives. The following analysis evaluates the potential for global warming/global climate change to adversely affect the function and performance of the Applicant Preferred Alternative and other action alternatives. Function and performance of the alternatives is evaluated in the context of flood risk. Given the uncertainties related to the future extent and effects of global climate change, the analysis focuses on identifying reasonably foreseeable direct effects on flood risk along the FRLRP Segment 2 levee attributable to global climate change.

### **4.3.1 POTENTIAL EFFECTS OF GLOBAL CLIMATE CHANGE**

Results of global climate change that could affect flood risk in a particular area are sea level rise and changes in precipitation and resulting runoff patterns.

Sea levels have risen approximately 7 inches worldwide during the last century (California Climate Change Center 2006), and sea levels are predicted to rise an additional 7–22 inches by 2100 (Intergovernmental Panel on Climate Change 2007). Higher sea levels can result in higher flood stage elevations in areas close to the coast or at elevations close to sea level. However, the proposed project site is approximately 100 miles inland from the Pacific coastline and at an elevation of 30 to 55 feet above mean sea level. Sea levels would need to rise

substantially more than current projections before any effects on hydrologic conditions at the proposed project site might occur. Sea level rise is therefore not considered further in this analysis.

Changes in precipitation patterns can alter the volume and timing of high water events in a river system and thus alter flood risk. Climate change can affect precipitation in a variety of ways, such as by changing the following:

- ▶ overall amount of precipitation,
- ▶ type of precipitation (rain vs. snow), and
- ▶ timing and intensity of precipitation events.

Each of these issue areas is discussed below as they relate to flows in the Feather River adjacent to the FRLRP Segment 2 levee. Both the Yuba and Feather Rivers are directly referenced because the Yuba River has a significant influence on flows passing the FRLRP Segment 2 levee on the Feather River.

### **4.3.2 PRECIPITATION AMOUNT**

The Intergovernmental Panel on Climate Change (IPCC) predicts that increasing global surface temperatures resulting from global climate change are very likely to result in changes in precipitation. Global average precipitation is expected to increase during the 21<sup>st</sup> century as the result of climate change, based on global climate models. However, global climate models are generally not well suited for predicting regional changes in precipitation because of their coarse level of outputs compared to the scale of regionally important factors that affect precipitation (e.g., maritime influences, effects of mountain ranges) (IPCC 2001, 2007).

Therefore, while increasing precipitation on a global scale is generally an expected result of climate change, significant regional differences in precipitation trends can be expected. Some recent regional modeling efforts conducted for the western United States indicate that overall precipitation will increase (Kim et al. 2002, Snyder et al. 2002), but considerable uncertainty remains because of differences among larger-scale global climate change models (GCMs). Where precipitation is projected to increase in California, the increases are centered in northern California (Kim et al. 2002, Snyder et al. 2002) and in winter. However, various California climate models provide mixed results regarding changes in total annual precipitation in the state through the end of this century. Models predicting the greatest amount of warming generally predict moderate decreases in precipitation; on the other hand, models projecting smaller increases in temperature tend to predict moderate increases in precipitation (Dettinger 2005). In addition, an IPCC review of multiple global GCMs identifies much of California as an area where less than 66% of the models evaluated agree on whether annual precipitation would increase or decrease, and therefore, no conclusion on an increase or decrease can be provided (IPCC 2007). Considerable uncertainties about the precise effects of climate change on California (and more specifically the Yuba-Feather River system) hydrology and water resources will remain until there is more precise and consistent information about how precipitation patterns, timing, and intensity will change (Kiparsky and Gleick 2005, DWR 2006).

Given the uncertainty associated with projecting changes in the amount of annual precipitation in the Yuba-Feather River system, no conclusions can be drawn regarding potential effects of climate change on precipitation volumes as they relate to reasonably foreseeable effects on flood risk via high water events.

#### **4.3.2.1 TYPE OF PRECIPITATION (RAIN VS. SNOW)**

As early as the mid-1980s and early 1990s, regional hydrologic modeling of global warming impacts has suggested with increasing confidence that higher temperatures will affect the timing and magnitude of snowmelt and runoff in California (Gleick 1986, 1987; Lettenmaier and Gan 1990; Lettenmaier and Sheer 1991; Nash and Gleick 1991a, 1991b; Hamlet and Lettenmaier 1999). Over the past two decades, this has been one of the most persistent and well-established findings on the impacts of climate change for water resources in the United States

and elsewhere, and it continues to be the major conclusion of regional water assessments (Knowles and Cayan 2002).

By delaying runoff during winter when precipitation is greatest, snow accumulation in the Sierra Nevada acts as a massive natural reservoir for California. There is very high confidence that higher temperatures will lead to substantial changes in the dynamics of snowfall and snowmelt in watersheds with substantial snow (Kiparsky and Gleick 2005, DWR 2006). Simulations conducted by N. Knowles and D. R. Cayan (Knowles and Cayan 2002) project a loss in April snowpack in the Sierra Nevada of approximately 5% with a 0.6°C (1.1°F) increase in average annual temperature, an approximately 33% loss with a 1.6°C (3.4°F) rise, and an approximately 50% loss in April snowpack with a 2.1°C (4.9°F) average annual temperature rise.

Based on the results of a variety of regional climate models, it is reasonably foreseeable that snowpack will be reduced and/or will melt earlier or more rapidly in the Yuba-Feather River system watershed. This could alter the timing and volume of runoff entering reservoirs on the Yuba-Feather River system and passing by the FRLRP Segment 2 levee. The effects of climate change on runoff patterns and the potential for any foreseeable changes to flood risk for the Applicant Preferred Alternative – ASB Setback Levee Alternative and other alternatives are described below in the discussion of runoff.

#### **4.3.2.2 TIMING AND INTENSITY OF PRECIPITATION EVENTS**

While variability in weather patterns is not well modeled in large-scale GCMs, some modeling studies suggest that the variability of the hydrologic cycle increases when mean precipitation increases, possibly accompanied by more intense local storms and changes in runoff patterns (DWR 2006). However, the results of another long-standing model point to an increase in incidents of drought, resulting from a combination of increased temperature and evaporation along with decreased precipitation (DWR 2006). Based on the first model mentioned, this decrease in precipitation would lead to reduced variability in hydrologic cycles.

A study that analyzed 20 GCMs currently in use worldwide suggests that the West Coast may be less affected by extreme droughts than other areas, instead having increased average annual rainfall (Meehl et al. 2000).

A separate study that reviewed several GCM scenarios showed increased risk of large storms and flood events for California (Miller et al. 1999). Conflicting conclusions about climatic variability and the nature of extreme weather events (e.g., droughts, severe storms, or both) support the need for additional studies with models featuring higher spatial resolution (Kiparsky and Gleick 2005, DWR 2006).

Although various climate change models predict some increase in variability of weather patterns and an increasing incidence of extreme weather events, there is no consistency among the model results, with some predicting increased incidents of droughts and others predicting increased frequency of severe storm events. Given the uncertainty associated with projecting the type and extent of changes in climatic variability and the speculative nature of predicting incidents of extreme weather events, this potential climate change effect is not considered to have a reasonably foreseeable direct effect on potential flood risk along the FRLRP Segment 2 levee.

#### **4.3.2.3 RUNOFF PATTERNS**

Detailed estimates of changes in runoff as a result of climate change have been produced for California using regional hydrologic models. By using anticipated, hypothetical, and/or historical changes in temperature and precipitation and models that include realistic small-scale hydrology, modelers have consistently seen substantial changes in the timing and magnitude of runoff resulting from projected changes in climatic variables (Kiparsky and Gleick 2005). Model results indicate that a declining proportion of total precipitation falls as snow as temperatures rise, more winter runoff occurs, and remaining snow melts sooner and faster in spring (Miller et al. 1999, Knowles and Cayan 2002). In some basins, spring peak runoff may increase; in others, runoff volumes may

shift to earlier in the spring and winter (Kiparsky and Gleick 2005, DWR 2006). If snowpack declines, it is also possible that the incidence or severity of flood events resulting from “rain on snow” conditions could also decline.

Hydrology in the Yuba-Feather River system (as well as almost all major Central Valley Rivers and the Delta) is highly dependent on the interaction between Sierra Nevada snowpack, runoff, and management of reservoirs. Potential changes made to the operation of the New Bullards Bar and Oroville Dams, such as amount of reservoir space retained for flood storage, retained annual carryover volumes, and timing and volume of releases in response to altered Sierra Nevada runoff patterns could substantially alter how those runoff patterns are experienced in the Yuba-Feather River system and at the FRLRP Segment 2 site. It is also possible that as climate change continues to progress over the next 50–100 years, new water storage projects (e.g., on-stream or offstream storage reservoirs, expanding capacity at existing reservoirs) may be put in place, either on the Yuba-Feather River system or elsewhere, that could allow for modifications to the operation of the New Bullards Bar and Oroville Dams. Given the integrated nature of the water system in California, even increased storage capacity outside the Yuba-Feather River system could benefit water management in the Yuba-Feather River system by allowing the New Bullards Bar and Oroville Dams to hold less retained water for domestic or agriculture use and retain more capacity for flood control. Therefore, although changed runoff patterns related to decreasing snowpack are reasonably foreseeable, significant uncertainties remain regarding how those changes may affect flow patterns in the Yuba-Feather River system. Runoff patterns in the Yuba-Feather River system depend not just on how climatic conditions might change, but also on a wide range of human actions and management decisions.

Given the uncertainty associated with projecting changes in runoff patterns in the Yuba-Feather River system, this potential climate change effect is speculative and not considered to have a reasonably foreseeable direct effect on flood risk along the FRLRP Segment 2 levee.

### **4.3.3 CONCLUSION**

Because of significant uncertainty in projecting future conditions related to the effects of climate change, the effects of climate change discussed above are not considered to have a reasonably foreseeable direct effect on flood risk along the FRLRP Segment 2 levee. Even if climate change were to result in some increase in flood stage elevation along the FRLRP Segment 2 levee, the Applicant Preferred Alternative – ASB Setback Levee Alternative and other action alternatives are designed to provide 200-year flood protection. Flows in the Feather River during high water events would need to increase significantly for the Applicant Preferred Alternative and other action alternatives to provide less than 100-year flood protection. In addition, the Applicant Preferred Alternative and other action alternatives substantially increase the level of flood protection provided by the FRLRP Segment 2 levee relative to existing conditions (i.e., increasing from 20-year flood protection to 200-year flood protection). Therefore, implementation of the Applicant Preferred Alternative and other action alternatives would make this levee segment more resistant to potential changes in flood risk conditions that might result from global climate change.

## **5.0 COMPLIANCE WITH OTHER ENVIRONMENTAL LAWS AND REGULATIONS**

### **5.1 FEDERAL LAWS AND REGULATIONS**

#### **5.1.1 NATIONAL HISTORIC PRESERVATION ACT**

National Historic Preservation Act of 1966, as amended (16 USC Section 470 et seq.), historic and archaeological data preservation, as amended (16 USC Section 469 et seq.), Archaeological Resources Protection Act (16 USC Section 470aa et seq.), Protection of Historic Properties (36 CFR 800), Abandoned Shipwreck Act (43 USC Section 2102 et seq.).

Section 106 of the National Historic Preservation Act (NHPA) and its implementing regulations (36 CFR 800, as amended in 2004) require Federal agencies to consider the potential effects of their proposed undertakings on historic properties. Historic properties are cultural resources that are listed on, or are eligible for listing on, the National Register of Historic Places (NRHP) (36 CFR 800.16[l]). Undertakings include activities directly carried out, funded, or permitted by Federal agencies. Federal agencies must also allow the Advisory Council on Historic Preservation (ACHP) to comment on the proposed undertaking and its potential effects on historic properties.

Cultural resources surveys have been conducted throughout the project area. One potentially significant cultural resources site (CA-Yub-5) could be affected by project activities. A cultural resources assessment has been prepared and no significant adverse effects on cultural resources are anticipated with implementation of mitigation measures. On February 7, 2008, the Corps initiated consultation with the State Historic Preservation Officer (SHPO) under Section 106 of the National Historic Preservation Act of 1966. A Memorandum of Agreement (MOA) between the U.S. Army Corps of Engineers (Corps), the Three Rivers Levee Improvement Authority (TRLIA), and the SHPO was prepared to address protection of cultural resources at the Segment 2 project site and the potential for adverse effects to CA-Yub-5. As a federally recognized tribe with a direct interest in the Area of Potential Effects for the project, the Enterprise Rancheria was invited to be a concurring party to the MOA. On May 12, 2008, the SHPO sent a letter to the Corps that affirmed the SHPO's concurrence with the Corps' determination of the Area of Potential Effects for the project. On June 12, 2008, the Corps sent the draft MOA to the Enterprise Rancheria and the Advisory Council on Historic Preservation (ACHP) for review and comment. In correspondence sent to the Corps on July 3, the ACHP declined to participate in consultation (i.e., no objections were raised), and no response was received from the Enterprise Rancheria on the draft MOA. Consulting parties completed execution of the MOA on July 22, 2008. A Historic Property Treatment Plan (HPTP) was prepared in accordance with the terms specified in the MOA and submitted to the Corps and the SHPO on August 21, 2008. The HPTP contains mitigation measures for potential effects on cultural resources that are consistent with those proposed in this EIS. Corps staff has indicated their concurrence with the HPTP, and no comments were received from the SHPO. A draft Cultural Resources Construction Monitoring and Inadvertent Discovery Plan (Construction Monitoring Plan) was also prepared to address required actions should previously unidentified cultural resources be uncovered during project construction. Once approved by the Corps and the SHPO, the Construction Monitoring Plan will be part of the HPTP. The HPTP has also been submitted to Enterprise Rancheria for review and comment; however, at the time this FEIS was prepared, no comments had been received. Upon completion of the above-described actions, the Applicant Preferred Alternative – Above Star Bend (ASB) Setback Levee Alternative (also referred to as the “Applicant Preferred Alternative”) will be in full compliance with the NHPA.

#### **5.1.2 CLEAN AIR ACT**

Clean Air Act (42 USC Section 1857 et seq. (1970), as amended and recodified, 42 USC Section 7401 et seq. [Supp II 1978])

The Federal Clean Air Act (CAA) required the U.S. Environmental Protection Agency (EPA) to establish national ambient air quality standards (NAAQS). EPA has established primary and secondary NAAQS for the following criteria air pollutants: ozone, respirable particulate matter (PM<sub>10</sub>), fine particulate matter (PM<sub>2.5</sub>), carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>), sulfur dioxide (SO<sub>2</sub>), and lead. The primary standards protect the public health and the secondary standards protect public welfare. The CAA also required each state to prepare an air quality control plan referred to as a State Implementation Plan (SIP). Under the CAA, the primary responsibility for planning for attainment and maintenance of the NAAQS rests with the state and local agencies. Accordingly, state and local air quality agencies are also designated as the primary permitting and enforcement authorities for most CAA requirements.

An analysis of air quality impacts has been completed. The Applicant Preferred Alternative – ASB Setback Levee Alternative would not exceed EPA’s general conformity de minimis thresholds or hinder the attainment of air quality objectives in the local air basin. The Applicant Preferred Alternative is in full compliance with the CAA.

### **5.1.3 CLEAN WATER ACT (33 USC SECTION 1251 ET SEQ. [1976 & SUPP II 1978])**

Clean Water Act (CWA) Section 404 establishes a requirement for a project applicant to obtain a permit from the Corps before engaging in any activity that involves discharge of dredged or fill material into “waters of the United States,” including wetlands. Fill material means material placed in waters of the United States where the material has the effect of replacing any portion of a water of the United States with dry land, or changing the bottom elevation of any portion of a water of the United States. Examples of fill material include but are not limited to rock, sand, soil, clay, plastics, construction debris, wood chips, overburden from mining or other excavation activities, and material used to create any structure or infrastructure in waters of the United States. Waters of the United States include navigable waters of the United States; all other waters where the use, degradation, or destruction of the waters could affect interstate or foreign commerce; tributaries to these waters; and wetlands that are adjacent to these waters. Wetlands are defined as those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Jurisdictional wetlands must meet three wetland delineation criteria: hydrophytic vegetation, hydric soil, and wetland hydrology. Many surface waters and wetlands in California meet the criteria for waters of the United States, including intermittent streams and seasonal wetlands.

Under Section 404 of the CWA, the Corps regulates and issues permits for activities that involve the discharge of dredged or fill materials into waters of the United States. Fill of less than one-half acre of nontidal waters of the United States for a variety of projects can generally be authorized under USACE’s nationwide general permit (NWP) program, provided that the project satisfies the terms and conditions of the particular NWP. Fills that do not qualify for a NWP or regional general permit require an individual permit.

Before the Corps can issue a permit under CWA Section 404, it must determine that the project is in compliance with the CWA Section 404(b)(1) guidelines. The Section 404(b)(1) guidelines specifically require that “no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences” (CFR Title 40, Section 230.10[a] [40 CFR 230.10(a)]). Based on this provision, the applicant is required to evaluate opportunities that would result in less adverse impact on the aquatic ecosystem. A permit cannot be issued, therefore, in circumstances where a less environmentally damaging practicable alternative exists that would fulfill the project purpose. An alternative is practicable if it is available and capable of being done after cost, existing technology, and logistics are taken into consideration in light of the overall project purpose as determined by the Corps. If it is otherwise a practicable alternative, an area not presently owned by the project applicant(s) that could reasonably be obtained, used, expanded, or managed to fulfill the purpose of the proposed activity may be considered.



On June 13, 2007, EDAW, on behalf of TRLIA, submitted to the Corps a preliminary wetland delineation for Segment 2. An approved jurisdictional determination was completed on March 11, 2008. A copy of this delineation and the jurisdictional determination is provided in Appendix B. A Section 404 individual permit application for Segment 2 of the FRLRP, including an alternatives analysis in conformance with Section 404(b)(1) guidelines, was submitted to the Corps in 2007. Consultation between the Corps and TRLIA on wetlands issues has included preparation of a conceptual mitigation plan, which has been accepted by the Corps as providing appropriate compensation for the project's effects to waters of the U.S. TRLIA is also requesting permission from the Corps for alteration of a federal project levee pursuant to Section 14 of the Rivers and Harbors Act of 1899 (Section 408). Issuance of the Section 404 permit will not occur until after the Section 408 permission has been granted. The Corps decision about whether to grant TRLIA the requested Section 408 and Section 404 permissions is expected to be made in early November 2008.

Refer to Section 3.6, "Waters of the United States and Wetlands," for an analysis of the potential effects of the project on waters of the U.S., including wetlands. "Mitigation Measure 3.6-a: Complete Section 404 Permit Process and Mitigate for Wetland Acreage Affected on a 'No-Net-Loss' Basis," describes the mitigation strategy contained in the conceptual mitigation plan. Once the Section 404 permit is granted, the Applicant Preferred Alternative – ASB Setback Levee Alternative will be in full compliance with the Clean Water Act.

In accordance with Section 401 of the Clean Water Act, projects that apply for a Corps permit for discharge of dredged or fill material must obtain water quality certification from the appropriate regional water quality control board indicating that the project will uphold state water quality standards. An application for water quality certification was submitted to the Central Valley Regional Water Quality Control Board (RWQCB) in August 2007 on behalf of TRLIA for the Applicant Preferred Alternative.

#### **5.1.4 ENDANGERED SPECIES ACT (16 USC SECTION 1531 ET SEQ.)**

The U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) have regulatory authority over Federally listed species under the federal Endangered Species Act (ESA). Under ESA, a permit to "take" a listed species is required for any Federal action that may harm an individual of that species. Take is defined under ESA Section 9 as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Under Federal regulation, take is further defined to include habitat modification or degradation where it would be expected to result in death or injury to listed wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. ESA Section 7 outlines procedures for Federal interagency cooperation to conserve Federally listed species and designated critical habitat. Section 7(a)(2) requires Federal agencies to consult with USFWS and NMFS to ensure that they are not undertaking, funding, permitting, or authorizing actions likely to jeopardize the continued existence of listed species.

A list of threatened and endangered species that may be in the project area was obtained from USFWS. An evaluation of potential project effects was conducted. USFWS and NMFS began providing technical assistance directly to TRLIA regarding the FRLRP in February 2007. Biological Assessments prepared for species under the jurisdiction of the USFWS and NMFS were provided by the Corps to the respective agencies in November 2007, thereby initiating formal consultation with these agencies. The project could potentially affect two species under the jurisdiction of the USFWS: valley elderberry longhorn beetle and giant garter snake. Species under the jurisdiction of the NMFS that could be affected consist of three chinook salmon environmentally significant units (ESUs), one steelhead ESU, and green sturgeon, as well as essential fish habitat. With implementation of the mitigation measures proposed in the Biological Assessment prepared for NMFS, NMFS has concurred with a "not likely to adversely affect" determination for species and resources under its jurisdiction. On August 28, 2008, USFWS issued the final Biological Opinion (BO) for the Segment 2 setback levee project (Applicant Preferred Alternative). The final BO includes findings, recommendations, and mitigation measures addressing species and resources under its jurisdiction. The final BO is attached to this EIS in Appendix H, "Correspondence Regarding

Special-Status Species.” Consultation with USFWS under ESA Section 7 is complete, and the Applicant Preferred Alternative – ASB Setback Levee Alternative is in full compliance with the ESA.

### **5.1.5 MIGRATORY BIRD TREATY ACT OF 1918 (16 USC SECTION 703 ET SEQ.) AND EXECUTIVE ORDER 13186, RESPONSIBILITIES OF FEDERAL AGENCIES TO PROTECT MIGRATORY BIRDS**

The Migratory Bird Treaty Act (MBTA), first enacted in 1918, implements domestically a series of treaties between the United States and Great Britain (on behalf of Canada), Mexico, Japan, and the former Soviet Union that provide for international migratory bird protection. The MBTA authorizes the Secretary of the Interior to regulate the taking of migratory birds; the act provides that it shall be unlawful, except as permitted by regulations, “to pursue, take, or kill any migratory bird, or any part, nest or egg of any such bird...” (U.S. Code Title 16, Section 703). This prohibition includes both direct and indirect acts, although harassment and habitat modification are not included unless they result in direct loss of birds, nests, or eggs. The current list of species protected by the MBTA includes several hundred species and essentially includes all native birds. The act offers no statutory or regulatory mechanism for obtaining an incidental take permit for the loss of nongame migratory birds.

Compliance with the MBTA is being addressed through compliance with the ESA and the California Environmental Quality Act (CEQA). Mitigation measures to minimize potential project effects on nesting raptors, including preconstruction surveys, and establishing buffers around active nests, were committed to by TRLIA and its primary construction contractor through the CEQA environmental impact report (EIR) process. Implementation of the measures began with nesting raptor surveys within the project construction area commencing in February 2008. The Applicant Preferred Alternative – ASB Setback Levee Alternative is in full compliance with the MBTA.

Executive Order (EO) 13186 directs Federal departments and agencies to take certain actions to further implement the MBTA. Specifically, the Order directs Federal agencies, whose direct activities will likely result in the take of migratory birds, to develop and implement a Memorandum of Understanding (MOU) with the USFWS that shall promote the conservation of bird populations. The Order would not affect Federal-aid projects because actions delegated to or assumed by nonfederal entities, or carried out by nonfederal entities with Federal assistance, are not subject to the Order, although such actions continue to be subject to the MBTA itself. Therefore, the FRLRP Segment 2 project is not subject to EO 13186.

### **5.1.6 FISH AND WILDLIFE COORDINATION ACT (16 USC SECTION 661 ET SEQ.)**

The Fish and Wildlife Coordination Act (FWCA) ensures that fish and wildlife receive consideration equal to that of other project features for projects that are constructed, licensed, or permitted by Federal agencies. The FWCA requires that the views of USFWS, NMFS, and the applicable state fish and wildlife agency be considered when impacts are evaluated and mitigation needs determined. Consideration of the USFWS position and recommendations is required by both FWCA and by the National Environmental Policy Act (NEPA) as part of the NEPA Scoping requirements. The USFWS position and recommendations must be documented in the administrative record. A Coordination Act Report (CAR) is required before the Record of Decision (ROD) is signed.

The USFWS, NMFS, and the California Department of Fish and Game (DFG) have provided coordinated input on the project through 2006, 2007, and 2008. A majority of the coordination was conducted via telephone conversations, meetings, and e-mail correspondence. Coordination with USFWS continues, and ESA Section 7 consultation with NMFS and USFWS has been completed. TRLIA is currently consulting with DFG regarding California Endangered Species Act (CESA) Section 2081 incidental take authorization. Sacramento District Corps staff members coordinated with USFWS regarding preparation of the CAR, which was completed on October 2,

2008 (see Appendix H). The Applicant Preferred Alternative – ASB Setback Levee Alternative is in full compliance with the FWCA.

### **5.1.7 WILD AND SCENIC RIVERS ACT (16 USC SECTION 1271 ET SEQ.), PRESIDENT’S ENVIRONMENTAL MESSAGE OF AUGUST 1979, AND COUNCIL ON ENVIRONMENTAL QUALITY (CEQ) MEMORANDUM OF AUGUST 10, 1980, FOR HEADS OF AGENCIES**

The purpose of the Wild and Scenic Rivers Act is to preserve and protect wild and scenic rivers and immediate environments for the benefit of present and future generations. The portions of the Feather River adjacent to the Applicant Preferred Alternative – ASB Setback Levee Alternative are not designated as components of the Wild and Scenic Rivers system; therefore, compliance with the Wild and Scenic Rivers Act is not required.

### **5.1.8 SECTION 14 OF THE RIVERS AND HARBORS ACT OF 1899 (33 USC SECTION 408), REFERRED TO AS “SECTION 408” FOR ALTERATION OF A FEDERAL PROJECT LEVEE**

Under Section 14 of the Rivers and Harbors Act of 1899 (33 USC 408), referred to as “Section 408,” the Secretary of the Army, on the recommendation of the Chief of Engineers, may grant permission for the alteration of the Federal levee system by a non-Federal entity if the alteration would not be injurious to the public. All three action alternatives evaluated in this EIS would be subject to Section 408 permission. This EIS will be used to support the decision whether to grant permission for implementation of the Applicant Preferred Alternative – ASB Setback Levee Alternative or other action alternative pursuant to Section 408.

TRLIA has requested approval from the California Central Valley Flood Protection Board (CVFPB) to construct alterations proposed by TRLIA to the Federal project levee along the east bank of the Feather River within Reclamation District (RD) 784, Yuba County, California. In correspondence to the Corps on December 10, 2007, the CVFPB requested a determination from the Corps allowing alteration of the Federal project levee as proposed by TRLIA. A summary report describing the conditions of the existing system, the need for the project, details of the proposed alteration, and the public benefit from the alteration accompanied that request. Action on this request is pending completion of the NEPA process for this project. If the Section 408 permission is granted, the Applicant Preferred Alternative – ASB Setback Levee Alternative would be in full compliance with Section 408 requirements.

### **5.1.9 EXECUTIVE ORDER 11988, FLOODPLAIN MANAGEMENT**

Executive Order 11988, Floodplain Management (May 24, 1977), directs Federal agencies to issue or amend existing regulations and procedures to ensure that the potential effects of any action it may take in a floodplain are evaluated and that its planning programs and budget requests reflect consideration of flood hazards and floodplain management. The purpose of this directive is “to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative.” Guidance for implementation of Executive Order 11988 is provided in the floodplain management guidelines of the U.S. Water Resources Council (40 CFR 6030; February 10, 1978) and in *A Unified National Program for Floodplain Management*, prepared by the Federal Interagency Floodplain Management Taskforce.

Improvements to the levees protecting the RD 784 area have been determined by the Corps, the State, and TRLIA to be the most feasible method of providing adequate flood protection to existing development in the RD 784 area. Other options to improve flood protection for existing development, such as ring levees or raising of structures are not feasible due to the dispersed nature of development in the RD 784 area. Although the Applicant

Preferred Alternative – ASB Setback Levee Alternative would fail to discourage further development within the basin, this action is consistent with efforts by the State of California to comprehensively address floodplain development and flood risk on a regional scale. The CVFPB April 2006 resolution includes various conditions that must be met to allow continued development, to which all parties agreed. TRLIA made a commitment to use its best efforts to complete all elements of the flood control program by 2008 to protect development proceeding in accordance with applicable plans.

The Applicant Preferred Alternative will reduce the risk of flood loss and minimize the impact of floods on human health, safety, and welfare by strengthening existing flood control infrastructure protecting significant existing development. Because there is no practicable alternative to the floodplain development indirectly associated with the project, and because the project will improve flood control capacity, it satisfies Executive Order 11988.

### **5.1.10 EXECUTIVE ORDER 11990, PROTECTION OF WETLANDS**

The purpose of EO 11990 is to “minimize the destruction, loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands.” To meet these objectives, EO 11990 requires Federal agencies, in planning their actions, to consider alternatives to wetland sites and limit potential damage if an activity affecting a wetland cannot be avoided. EO 11990 applies to:

- ▶ acquisition, management, and disposition of Federal lands and facilities construction and improvement projects which are undertaken, financed or assisted by Federal agencies; and
- ▶ Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulation, and licensing activities.

EO 11990 directs the Corps to provide leadership and take action to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands in implementing civil works. The Applicant Preferred Alternative – ASB Setback Levee Alternative includes full compensation for any loss or degradation of wetlands. The Applicant Preferred Alternative is in full compliance with EO 11990.

### **5.1.11 EXECUTIVE ORDER 12898, ENVIRONMENTAL JUSTICE**

Environmental justice refers to “nondiscrimination in federal programs substantially affecting human health and the environment” and “providing minority communities and low-income communities with access to public information on, and an opportunity for public participation in, matters relating to human health or the environment.” In particular, it involves preventing minority and low-income communities from being subjected to disproportionately high and adverse environmental effects of federal actions.

The Applicant Preferred Alternative – ASB Setback Levee Alternative is in full compliance with EO 12898 (see Section 3.16, “Socioeconomics and Environmental Justice”). Project construction would not affect any minority or low-income communities. Increased flood protection provided by the Applicant Preferred Alternative would directly benefit several minority and low-income communities in the RD 784 area.

### **5.1.12 FARMLAND PROTECTION POLICY ACT (7 USC SECTION 4201 ET SEQ.)**

The Farmland Protection Policy Act (FPPA) is intended to minimize the impact of Federal programs with respect to the conversion of farmland to nonagricultural uses. It ensures that, to the extent possible, Federal programs are administered to be compatible with state, local, and private programs and policies to protect farmland. The Natural Resources Conservation Service (NRCS) is the agency primarily responsible for implementing the FPPA.

As discussed in the land use and agriculture section of this EIS, the Applicant Preferred Alternative – ASB Setback Levee Alternative would result in the irretrievable loss of approximately 210 acres of prime farmland, 35 acres of farmland of statewide importance, and 2 acres of unique farmland to nonagricultural uses. Implementation of the Applicant Preferred Alternative would also lead to the removal of additional Important Farmland from agricultural production (e.g., conversion to habitat), although irretrievable losses of this land would not occur. However, the Applicant Preferred Alternative also provides increased flood protection to thousands of acres of existing cultivated farmland, including prime farmland and other important farmland designated by the Farmland Mapping and Monitoring Program (FMMP). Farmland retained within the setback area would also be protected in perpetuity from future development pressures by being placed within the Feather River floodway. The Applicant Preferred Alternative is in full compliance with the Farmland Protection Policy Act.

### **5.1.13 FEDERAL COASTAL ZONE MANAGEMENT ACT (16 USC SECTION 1451-1465)**

The Coastal Zone Management Act (16 U.S.C. 1451–1465) established the national policy to preserve, protect, develop, and restore the nation’s coastal zones. The Coastal Zone Management Act is intended to “encourage and assist” the states in developing, implementing monitoring and enforcing coastal management programs to achieve wise use of the land and water resources of the coastal zones, including the Great Lakes. The law provides for various grants to coastal states for development of coastal zone management plans, management of various programs once such plans are developed, and to encourage additional programs to preserve or restore certain areas, including deteriorating and underutilized urban waterfronts or ports. Provisions of the law establish extensive coordination, cooperation, and participation guidelines for Federal and state agencies, local governments, and the public. The Act establishes a Coastal Zone Management Fund and provides for coastal zone enhancement grants and technical assistance programs.

The California Coastal Act (Public Resources Code Division 20) constitutes the Coastal Zone Management Program in California. The project site does not fall within the Coastal Zone, therefore this Act does not apply to the Applicant Preferred Alternative – ASB Setback Levee Alternative or other action alternatives.

### **5.1.14 NOISE CONTROL ACT OF 1972 (42 U.S.C. 4901 TO 4918)**

The Noise Control Act establishes a national policy to promote an environment for all Americans free from noise that jeopardizes their health and welfare. It authorizes and directs that Federal agencies, to the fullest extent consistent with their authority under Federal laws administered by them, carry out the programs within their control in such a manner as to further the policy declared in 42 U.S.C. 4901. Each department, agency, or instrumentality of the executive, legislative, and judicial branches of the Federal Government having jurisdiction over any property or facility or engaged in any activity resulting, or which may result in, the emission of noise shall comply with Federal, State, interstate, and local requirements respecting control and abatement of environmental noise.

Compliance with the Noise Control Act is being addressed through compliance with the Yuba County Noise Ordinance and CEQA. Mitigation measures to minimize potential project effects on sensitive receptors, including restricting hours of construction, have been provided. The Applicant Preferred Alternative – ASB Setback Levee Alternative is in full compliance with the Noise Control Act.

### **5.1.15 MAGNUSON-STEVENSON ACT (PUBLIC LAW [PL] 94-265)**

Section 305(b)(2)-(4) of the Magnuson-Stevens Act outlines the process for NMFS and the Regional Fishery Management Councils to comment on activities proposed by federal agencies (issuing permits or funding projects) that may adversely impact areas designated as essential fish habitat (EFH). EFH is defined as the waters and substrate necessary for fish to spawn, breed, feed, or grow to maturity (16 USC 1802[10]). The Corps, through its permitting process, must either incorporate NMFS recommendations for minimizing effects to EFH

(measures to avoid, minimize, or mitigate), or provide the basis for not adopting them. Under the Magnuson-Stevens Act, NMFS and the eight regional Fishery Management Councils were directed to describe and identify EFH in the fishery management plans for the purposes of reducing the adverse effects of fishing on EFH and encouraging the conservation and enhancement of EFH. As described below in Section 5.1.15, the Magnuson-Stevens Act was amended in 1996 through passage of the Sustainable Fisheries Act. Compliance with these acts is discussed below in Section 5.1.16, “Sustainable Fisheries Act (Public Law [PL] 104-297).”

#### **5.1.16 SUSTAINABLE FISHERIES ACT (PUBLIC LAW [PL] 104-297)**

In response to growing concern about the status of U.S. fisheries, the Sustainable Fisheries Act of 1996 (Public Law [PL] 104-297) was passed by Congress to amend the Magnuson-Stevens Fishery Conservation and Management Act (PL 94-265), the primary law governing marine fisheries management in the federal waters of the United States. Under the Sustainable Fisheries Act, consultation is required by NMFS on any activity that might adversely affect EFH. EFH includes those habitats that fish rely on throughout their life cycles. It encompasses habitats necessary to allow sufficient production of commercially valuable aquatic species to support a long-term sustainable fishery and contribute to a healthy ecosystem.

NMFS has provided a letter concurring that if measures included in the Biological Assessment (BA) are implemented, the Action – ASB Setback Levee Alternative is not likely to adversely affect fisheries resources under its jurisdiction. TRLIA is already legally committed to implementing mitigation measures to protect water quality and minimize fish stranding through the CEQA EIR process. The Applicant Preferred Alternative – ASB Setback Levee Alternative is in full compliance with the Sustainable Fisheries Act, and consequently, the Magnuson-Stevens Act.

#### **5.1.17 NATIVE AMERICAN GRAVES PROTECTION AND REPATRIATION ACT OF 1990 (104 STAT. 3048 PUBLIC LAW 101-601) (NAGPRA)**

For activities on Federal lands, Native American Graves Protection and Repatriation Act (NAGPRA) requires consultation with "appropriate" Indian tribes (including Alaska Native villages) or Native Hawaiian organizations prior to the intentional excavation, or removal after inadvertent discovery, of several kinds of cultural items, including human remains and objects of cultural patrimony. For activities on Native American or Native Hawaiian lands, which are defined in the statute, NAGPRA requires the consent of the Indian tribe or Native Hawaiian organization prior to the removal of cultural items. The law also provides for the repatriation of such items from Federal agencies and federally assisted museums and other repositories.

The FRLRP Segment 2 project does not involve federally-owned lands; therefore, NAGPRA does not apply.

#### **5.1.18 RESOURCE CONSERVATION AND RECOVERY ACT (RCRA), COMPREHENSIVE ENVIRONMENTAL RESPONSE COMPENSATION AND LIABILITY ACT (CERCLA) (TITLES 29, 40, AND 49 OF THE CODE OF FEDERAL REGULATIONS [CFR])**

At the federal level, the principal agency regulating the generation, transport, storage, and disposal of hazardous substances is EPA, under the authority of the Resource Conservation and Recovery Act (RCRA). EPA regulates hazardous substance sites under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA). Applicable federal regulations are outlined in Titles 29, 40, and 49 of the Code of Federal Regulations (CFR).

A Phase I Environmental Site Assessment was conducted on behalf of TRLIA for the Feather River Levee Repair Project (FRLRP) Segment 2 study area (GEI Consultants 2007). It was conducted in accordance with the American Society for Testing and Materials (ASTM) E1527-05, which addresses the Phase I Environmental Site Assessment process. The purpose of the Phase I assessment was to identify any recognized environmental

conditions within the study area. The assessment satisfies a mitigation requirement of the FRLRP EIR (TRLIA 2006b). A draft Phase II Environmental Site Assessment was completed in May 2008 on behalf of TRLIA to assess conditions at two former underground storage tank (UST) sites in the project area (GEI Consultants 2008). This EIS contains mitigation measures to address remediation of any contaminated sites that are present at the project site. The Applicant Preferred Alternative – ASB Setback Levee Alternative is in full compliance with these Acts.

### **5.1.19 FEDERAL AVIATION ADMINISTRATION (FAA) REGULATIONS FOR PROTECTING NAVIGABLE AIRSPACE (FAR PART 77) AND MANAGEMENT OF WILDLIFE HAZARDS ON AND/OR NEAR AIRPORTS (14 CFR 139)**

Part 77 of the Federal Aviation Regulations (FAR), “Objects Affecting Navigable Airspace,” has been adopted as a means of monitoring and protecting the airspace required for safe operation of aircraft and airports. FAR Section 77.13 requires that the FAA be notified of proposed construction or alteration of certain objects within a specified vicinity of an airport, including objects that exceed certain specified height limitations. The FAA is also responsible for enforcement of Title 14 Code of Federal Regulations, part 139 (14 CFR 139), including responsibilities relating to wildlife hazards and related safety concerns.

The northern end of the project site lies partially within the overflight zone of the Yuba County Airport, a general aviation airport operated by Yuba County. No FRLRP activities will take place in or near the clear zones or approach zones, and the project does not propose to construct structures that would exceed height limitations nor create habitat that would conflict with airport operations (no habitat attractive to waterfowl would be created) in the overflight zone. These regulations do not apply to the Applicant Preferred Alternative – ASB Setback Levee Alternative or the other action alternatives.

## **5.2 STATE LAWS AND REGULATIONS**

### **5.2.1 CALIFORNIA ENVIRONMENTAL QUALITY ACT**

An EIR was certified by TRLIA in February 2007. The Applicant Preferred Alternative – ASB Setback Levee Alternative is consistent with the EIR, although some modifications and more detailed information is available related to soil borrow areas, expansion of a waterside blanket, addition of a landside seepage berm, and reinforcement of Pacific Gas & Electric Company (PG&E) power lines. Separate addendums to the EIR verifying that these modifications and new information would not result in any new significant environmental effects were completed in April and May 2008, and both addendums have been certified by TRLIA. The Applicant Preferred Alternative is in full compliance with CEQA.

### **5.2.2 THE CENTRAL VALLEY FLOOD PROTECTION BOARD ENCROACHMENT PERMIT**

The CVFPB requires an encroachment permit for any activity along or near Federal flood control project levees and floodways or in CVFPB-designated floodways to ensure that proposed local actions or projects do not impair the integrity of existing flood control systems to withstand flood conditions. The CVFPB would require an encroachment permit and an approval of levee alteration through the permit process for the Applicant Preferred Alternative – ASB Setback Levee Alternative. As a CEQA Responsible Agency, the CVFPB actively participated in the TRLIA’s CEQA process and reviewed TRLIA’s CEQA document. The CVFPB will use the EIR to ensure it has met the requirements of CEQA before deciding whether to approve or permit project elements over which it has authority. The Applicant Preferred Alternative is in full compliance with the CVFPB’s requirements.



### **5.2.3 CLEAN WATER ACT SECTION 401 WATER QUALITY CERTIFICATION**

Under the CWA Section 401(a)(1), applicants for a Federal license or permit to conduct activities that may result in the discharge of a pollutant into waters of the United States must obtain certification from the state in which the discharge would originate or, if appropriate, from the interstate water pollution control agency with jurisdiction over affected waters at the point where the discharge would originate. Therefore, all projects with a Federal component that may affect state water quality (including projects that require Federal agency approval such as issuance of a Section 404 permit) must also comply with CWA Section 401. The Section 401 water quality certification certifies that the proposed activity will not violate state water quality standards. The regional water quality control boards administer the Section 401 program with the intent of prescribing measures necessary to avoid, minimize, or mitigate adverse impacts of proposed projects on water quality and ecosystems. As CEQA Responsible Agencies, the State Water Resources Control Board (SWRCB) and the RWQCB actively participated in TRLIA's CEQA process and reviewed TRLIA's CEQA document. The SWRCB and the RWQCB will use the EIR to ensure that CEQA requirements have been met before deciding whether to approve the Section 401 water quality certification agreement.

An application for a Section 401 water quality certification was submitted to the Central Valley RWQCB in August 2007 on behalf of TRLIA for the Applicant Preferred Alternative – ASB Setback Levee Alternative. A draft 401 agreement was provided by the RWQCB in May 2008 and is included in Appendix B of this EIS. The Applicant Preferred Alternative is in full compliance with the SWRCB's requirements.

### **5.2.4 STREAMBED ALTERATION AGREEMENT AND CALIFORNIA ENDANGERED SPECIES ACT SECTION 2081 INCIDENTAL TAKE AUTHORIZATION**

The California Department of Fish and Game (DFG) requires a Streambed Alteration Agreement for any activity that would change any lake, river, or stream in California. TRLIA has received a Streambed Alteration Agreement from DFG. CESA Section 2081 incidental take authorization would also be required for effects on state listed threatened/endangered species. TRLIA is currently in consultation with DFG regarding CESA Section 2081 authorization. The Applicant Preferred Alternative – ASB Setback Levee Alternative is in full compliance with the DFG regulations.

### **5.2.5 CALIFORNIA SURFACE MINING AND RECLAMATION ACT**

The California Surface Mining and Reclamation Act (SMARA) applies to entities seeking to conduct a surface-mining operation. Removal of soil from borrow areas may be classified as "surface mining" and SMARA authorization is being sought from the State Mining and Geology Board. The Applicant Preferred Alternative – ASB Setback Levee Alternative is in partial compliance with the State Mining and Geology Board regulations and is expected to be in full compliance by the time the ROD is signed.

### **5.2.6 STATE HISTORIC PRESERVATION OFFICER CONSULTATION**

Consultation with the State Historic Preservation Officer (SHPO) is underway. Archaeological site CA-Yub-5, a prehistoric village site, is located in the vicinity of the proposed setback levee alignment. It appears that CA-Yub-5 may be eligible for listing in the California Register of Historic Resources (CRHR) and the National Register of Historic Places (NRHP) and therefore may be considered a historical resource. The Applicant Preferred Alternative – ASB Setback Levee Alternative is in full compliance with the regulations requiring SHPO consultation.

## 5.2.7 STATE LANDS COMMISSION LEASE

The State Lands Commission has exclusive jurisdiction over all ungranted tidelands and submerged lands owned by the State and the beds of navigable rivers, sloughs, and lakes. A project cannot use these State lands unless a lease is first obtained from the State Lands Commission. The Applicant Preferred Alternative – ASB Setback Levee Alternative would not require the use of any State lands; therefore, no lease is required.

## 5.2.8 STATE PLAN OF FLOOD PROTECTION

The Central Valley Flood Protection Act of 2008 (Act), passed by the California legislature, recognizes that the Central Valley of California is experiencing unprecedented development, resulting in the conversion of historically agricultural lands and communities to densely populated residential and urban centers. The Act notes that many of these areas are protected by levees that were originally built to reclaim and protect agricultural land; some of these levees have been improved to reflect the impact of urbanization, but most have not. Thus, the Act concludes, through many years of practice, a dichotomous system of flood protection for urban and rural lands has developed.

Because of the potentially catastrophic consequences of flooding, the Act recognizes that the Federal government's current 100-year flood protection standard is not sufficient to protect urban and urbanizing areas within flood-prone areas throughout the Central Valley and declares that the minimum standard for these areas is a 200-year level of flood protection. To continue with urban development, cities and counties must develop and implement plans for achieving this new standard by 2025. At the same time, the Act recognizes that improvements to earthen levees reduce but do not eliminate the risk of flooding. Hence, linking land use decisions to flood risk and flood protection estimates is only one element of improving protection for lives and property in the Central Valley.

With respect to flood risk reduction, the Act calls upon the DWR to develop by the end of 2012 a comprehensive Central Valley Flood Protection Plan (also called the State Plan of Flood Protection) for protecting the lands currently within the Sacramento-San Joaquin River Flood Management System. The planning process is to be systemwide in nature, unfolding in three phases: (1) mapping of the 100-year and 200-year floodplains based on information from the Sacramento-San Joaquin River Basins Comprehensive Study; (2) identification of the existing and proposed performance standards for all facilities within the flood management system; and (3) proposals for additional structural and nonstructural facilities that may become part of the flood management system, including bypasses, floodway corridors, floodplain storage, or other projects that expand the capacity of the system; increase and improve the quantity, diversity, and connectivity of riparian, wetland, floodplain, and shaded riverine aquatic habitats, including the agricultural and ecological values of these lands; minimize the flood management system operation and maintenance requirements; and promote the recovery and stability of native species populations and overall biotic community diversity.

The Corps has implemented major modifications, reconstructions, and upgrades over the years in Segment 2 of the Feather River east bank levee in response to deficiencies identified during flood events. Two major federal flood protection efforts addressing the RD 784 area, the System Evaluation Project and the Yuba River Basin Project, resulted from the 1986 Central Valley floods and led to additional levee improvements in the RD 784 area. Since 2003, YCWA and then TRLIA have completed various studies to determine necessary actions for RD 784 levees to meet current FEMA accreditation requirements, as well as provide a 200-year level of flood protection. The Applicant Preferred Alternative – ASB Setback Levee Alternative is a component of Phase 4 of TRLIA's ongoing efforts to improve flood protection; the overall program and the Applicant Preferred Alternative – ASB Setback Levee Alternative have been well coordinated and integrated into flood planning efforts being implemented by the Corps, DWR, the CVFPB, and local agencies. Although the Central Valley Flood Protection Plan is not complete, the Applicant Preferred Alternative – ASB Setback Levee Alternative is fully consistent with the plan goals, policies, and objectives that are currently known.

## **5.3 LOCAL ORDINANCES**

### **5.3.1 FEATHER RIVER AIR QUALITY MANAGEMENT DISTRICT**

Air quality analysis based on coordination with the Feather River Air Quality Management District (FRAQMD) shows that project construction could result in emissions greater than local targets. However, FRAQMD requires best management practices be implemented for reducing emissions to help protect ambient air quality conditions. In addition to implementing these best management practices for reducing emissions, TRLIA would obtain all necessary permits from the FRAQMD. Accordingly, the Applicant Preferred Alternative – ASB Setback Levee Alternative is in full compliance with the local air district standards.

## **6.0 CONSULTATION AND COORDINATION**

This chapter summarizes public and agency involvement activities undertaken by the U.S. Army Corps of Engineers (Corps) and the Three Rivers Levee Improvement Authority (TRLIA) that have been conducted to date for this project, and which satisfy the National Environmental Policy Act (NEPA) requirements for public scoping and agency consultation and coordination. Public involvement conducted as part of compliance with the California Environmental Quality Act (CEQA) is also described. When an environmental impact report (EIR) was prepared as part of the CEQA process, it addressed the same activities considered in this environmental impact statement (EIS) and included a significant public involvement effort. The long history of flooding in the region has profoundly affected local residents and businesses, and the notable ongoing efforts to repair the levees have involved interrelated environmental review and permitting processes. At the local level, TRLIA continues to keep area residents, business owners, and other interested individuals informed on flood protection plans for the Reclamation District (RD) 784 area. Publically-noticed monthly board meetings provide status updates on flood protection projects. TRLIA staff meet with local landowners as necessary to address individual concerns. TRLIA also maintains a Web site (<http://www.trlia.org/>) with details on the current status of flood control projects in south Yuba County.

### **6.1 PUBLIC INVOLVEMENT UNDER CEQA**

On June 14, 2006, TRLIA issued a notice of preparation (NOP) of a draft environmental impact report (DEIR) for the Feather River Levee Repair Project (FRLRP). The public comment period on the NOP ended on July 14, 2006. A scoping meeting was held in Marysville on June 29, 2006, to solicit input on the scope of the DEIR from interested agencies, individuals, and organizations.

In accordance with CEQA review requirements, the DEIR was distributed for public and agency review and comment for a 45-day period, which ended on September 18, 2006. The distribution list for the DEIR and the Notice of Availability included approximately 270 federal, state, and local agencies, as well as individuals residing within the project area. TRLIA held a public meeting in Marysville on September 6, 2006, to receive input from agencies and the public on the DEIR. In addition, written comments from the public, reviewing agencies, and interested parties were received during the review period. TRLIA published the final EIR (FEIR) for the FRLRP on November 2, 2006, which included responses to comments received on the DEIR. The TRLIA board certified the complete EIR at a publicly noticed meeting of the TRLIA Board of Directors on February 6, 2007, and approved the alternative that includes construction of a setback levee along Segment 2 of the Feather River left bank levee.

### **6.2 PUBLIC INVOLVEMENT UNDER NEPA**

A notice was distributed to a mailing list on March 6, 2008, to announce the public scoping meeting and solicit input from interested agencies and the public as to the scope and content of the draft EIS (DEIS). The mailing list included public and private landowners within the project area. A notice of intent (NOI) to prepare an EIS was published in the Federal Register on February 29, 2008. Notice of the public scoping meeting was published in the Sacramento Bee (a daily newspaper with a distribution area covering the project region) on March 9, 2008.

The public scoping meeting was held on March 10, 2008, to brief interested parties on the proposed action, and obtain the views of local residents and other interested attendees on the scope and content of the DEIS. (Appendix K contains project scoping materials.) The meeting was presented in an open house format in the Board of Supervisors chambers at the Yuba County Government Center in Marysville. Representatives from the Corps, TRLIA, and environmental and engineering consultants to the Corps were available to answer questions and discuss aspects of the project. Attendees were provided the opportunity to submit comments on the content and scope of the DEIS. A court reporter was present at the meeting to record verbal comments, and comment sheets were provided to attendees for written comments. Details were given on how to submit comments to the

Corps after the meeting. No written comments were submitted at the meeting, and no comments were given to the court reporter. Written comments from a representative of Concerned Citizens for Responsible Growth were submitted to Corps staff during the public comment period. Those comments are included with the project scoping materials contained in Appendix K.

The Corps circulated the DEIS for the Segment 2 project on July 11, 2008. Approximately 145 copies of the DEIS were sent to a mailing list that included local, state, and federal agencies; landowners in the project area; local libraries; elected officials; and other interested organizations and individuals. The Corps also issued an “All Interested Parties” notice to an additional mailing list of approximately 25 people. A Notice of Availability (NOA) was published in the Federal Register on July 11, 2008, and a second public meeting was held in Marysville on August 4, 2008, to receive comments on the DEIS from agency representatives and other interested parties. Meeting attendees included three members of the public. No comments were submitted to Corps staff, TRLIA representatives, or project consultants during the meeting. The sign-in sheet from the public meeting is reproduced in Appendix A, “Comments and Responses to Comments on the Draft Environmental Impact Statement.” Comments received on the DEIS during the 45-day public review period were considered during preparation of this FEIS. Those comment letters are reproduced in Appendix A.

Newspaper articles regarding the FRLRP are regularly printed in the Marysville Appeal Democrat reporting on issues such as project funding, project schedule, and progress towards initiating construction. An article printed on March 21, 2008, titled, “Levee Project Gains; Hurdle Remains,” specifically mentioned the Corps’ preparation of an EIS.

### **6.3 NATIVE AMERICAN CONTACT PROGRAM AND OTHER CULTURAL RESOURCES CONSULTATION**

On February 7, 2008, the Corps initiated consultation with the State Historic Preservation Officer (SHPO) under Section 106 of the National Historic Preservation Act of 1966. A Memorandum of Agreement (MOA) between the Corps, TRLIA, and the SHPO was prepared to address protection of cultural resources at the Segment 2 project site and the potential for adverse effects to CA-Yub-5. As a federally recognized tribe with a direct interest in the Area of Potential Effects (APE) for the project, the Enterprise Rancheria was invited to be a concurring party to the MOA. Additional coordination with the Enterprise Rancheria is described below. On May 12, 2008, the SHPO sent a letter to the Corps that affirmed the SHPO’s concurrence with the Corps’ determination of the Area of Potential Effects (APE) for the project. On June 12, 2008, the Corps sent the draft MOA to the Enterprise Rancheria and the Advisory Council on Historic Preservation (ACHP) for review and comment. In correspondence sent to the Corps on July 3, the ACHP declined to participate in consultation (i.e., no objections were raised), and no response was received from the Enterprise Rancheria on the draft MOA. Consulting parties completed execution of the MOA on July 22, 2008. A Historic Property Treatment Plan (HPTP) was prepared in accordance with the terms specified in the MOA and submitted to the Corps and the SHPO on August 21, 2008. The HPTP contains mitigation measures for potential effects on cultural resources that are consistent with those proposed in this EIS. Corps staff has indicated their concurrence with the HPTP, and no comments were received from the SHPO. A draft Cultural Resources Construction Monitoring and Inadvertent Discovery Plan (Construction Monitoring Plan) was also prepared to address required actions should previously unidentified cultural resources be uncovered during project construction. Once approved by the Corps and the SHPO, the Construction Monitoring Plan will be part of the HPTP. The HPTP has also been submitted to Enterprise Rancheria for review and comment; however, at the time this FEIS was prepared, no comments had been received by the Corps.

On December 9, 2007, the Corps and EDAW staff attended a meeting with council and tribal members of the Enterprise Rancheria to discuss treatment of the CA-Yub-5 cultural resources site. A summary of concerns expressed by the tribal members is as follows:

- ▶ potential for erosion and sloughing at the site during flood events;
- ▶ potential for trespass on the site and illegal collection of artifacts by “pothunters” after the project is complete; and
- ▶ desire for appropriate treatment and protection of any resources that might be uncovered during and after project construction as a result of site disturbances and erosive forces.

Tribal members in attendance expressed a strong desire to leave the site in place and to not cause potential disturbance to the site with further archaeological testing. Possible methods for site stabilization were discussed at the meeting. On January 31, 2008, the Corps sent a letter to the Enterprise Rancheria outlining a plan for limited testing of CA-Yub-5 to establish a baseline of information for evaluation of potential impacts of the project on the site.

## 6.4 COORDINATION WITH OTHER FEDERAL AGENCIES

A list of threatened and endangered species that may occur in the FRLRP project area was obtained from the U.S. Fish and Wildlife Service (USFWS) in 2006 in support of the CEQA EIR process. An evaluation of potential project effects was conducted. USFWS and the National Marine Fisheries Service (NMFS) began providing technical assistance directly to TRLIA regarding the FRLRP in February 2007. Biological Assessments were prepared for species under the jurisdiction of the USFWS and NMFS and provided by the Corps to the respective agencies in November 2007. This initiated formal consultation between the Corps and USFWS and NMFS. The Biological Assessments addressed the project described as the Applicant Preferred Alternative – Above Star Bend (ASB) Setback Levee Alternative (also referred to as the Applicant Preferred Alternative) in this EIS.

In December 2007, NMFS provided a letter to the Corps determining that the Applicant Preferred Alternative is not likely to adversely affect species under its jurisdiction that might occur in the project area. NMFS also concluded that the Applicant Preferred Alternative would not adversely affect Essential Fish Habitat for Pacific salmon. Receipt of this letter concluded consultation for the Applicant Preferred Alternative (Appendix H, “Correspondence Regarding Special-Status Species”). On August 28, 2008, USFWS issued the final biological opinion (BO) addressing the potential effects of the Applicant Preferred Alternative on federally threatened terrestrial species, thereby completing Section 7 consultation between the Corps and USFWS. The final BO addresses USFWS findings, recommendations, and conservation measures to protect federally threatened species that could be affected by the project (Appendix H).

On June 27, 2008, USFWS submitted a draft Coordination Act Report (CAR) to the Corps, in accordance with the Fish and Wildlife Coordination Act (16 USC Section 661 et seq.) The CAR summarizes the status of consultation with the Corps and TRLIA, affirms its support of the Applicant Preferred Alternative, and states that consultation with the California Department of Fish and Game (DFG) and NMFS will be part of the process to finalize the CAR. USFWS submitted the completed CAR to the Corps on October 2, 2008 (Appendix H).

As part of the formal consultation and provision of technical assistance described above, both the Corps and TRLIA have coordinated extensively with USFWS and NMFS. Coordination has consisted of numerous meetings, telephone conversations, and exchanges of e-mail and written correspondence.

TRLIA is requesting permission from the Corps under Section 404 of the Clean Water Act (CWA) (33 USC 1344) for the placement of fill in jurisdictional waters of the United States. The U.S. Environmental Protection Agency (EPA) is ultimately responsible for oversight of matters related to the Federal Water Pollution Control Act as amended (federal Clean Water Act). For the FRLRP Segment 2 setback levee project, the Corps and the EPA share the responsibility for ensuring compliance with project activities that are subject to Section 404 of the CWA. Section 404 application materials submitted to the Corps in 2007 for the Segment 2 project include the preliminary wetland delineation (the approved jurisdictional determination was completed on March 11, 2008),

the Section 404 individual permit application, and the Section 404(b)(1) alternatives analysis (see Appendix B). The Corps has coordinated directly with the EPA on review of these materials. The Corps has also coordinated with the EPA during preparation of the EIS for the Segment 2 project. Responses to comments submitted by the EPA on the DEIS are contained in Appendix A of this FEIS, “Comments and Responses to Comments on the Draft Environmental Impact Statement.”

Coordination between the Corps and/or TRLIA and other federal agencies will continue as needed. Copies of the DEIS were also sent to Region IX of the Federal Emergency Management Agency, the U.S. Bureau of Reclamation, the U.S. Department of the Interior, the National Resources Conservation Service, and the Bureau of Indian Affairs. To date, no comments on the DEIS have been received from those agencies. Although no particular environmental issues are anticipated to require consultation with federal agencies that have not previously been informed on the project, it is possible that future coordination could occur between TRLIA and federal agencies such as the U.S. Department of Agriculture, the Federal Aviation Administration, or the U.S. Geological Survey.



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Wally Herger, U.S. Congressman, 2<sup>nd</sup> Congressional District  
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Dave Cox, State Senator, 1<sup>st</sup> Senate District  
Dianne Feinstein, U.S. Senator  
Barbara Boxer, U.S. Senator

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#### **9.2.1 U.S. GOVERNMENT**

Council on Environmental Quality  
FEMA Region IX  
National Oceanic and Atmospheric Administration, National Marine Fisheries Service  
Natural Resources Conservation Service  
Pacific Regional Office Bureau of Indian Affairs  
U.S. Army Corps of Engineers  
U.S. Bureau of Reclamation  
U.S. EPA, Division 9  
U.S. Fish and Wildlife Service  
Federal Aviation Administration

#### **9.2.2 STATE OF CALIFORNIA**

California Bay-Delta Authority  
California Department of Transportation  
California Environmental Protection Agency  
California Water Service Company  
Central Valley Flood Protection Board  
Central Valley Regional Water Quality Control Board  
Department of Boating and Waterways, Regulations Unit  
Department of Fish and Game  
Department of Toxic Substances Control  
Department of Water Resources  
Native American Heritage Commission  
State Historic Preservation Officer, Office of Historic Preservation  
State Lands Commission  
State Water Resources Control Board, Division of Water Rights  
The Resources Agency

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California Water Service Company  
Central Valley Flood Control Association  
City of Marysville  
City of Yuba City  
Cordua Irrigation District  
District 10-Hallwood Community Services District  
Feather River Air Quality Management District  
Feather Water District  
Hallwood Irrigation District  
Levee District No. 1 of Sutter County  
Linda County Water District  
Linda Fire Protection District  
Loma Rica-Browns Valley Community Services District  
Marysville Levee Commission  
Northern California Water Association  
Olivehurst Public Utilities District  
Reclamation District 10  
Reclamation District 784  
Reclamation District 817  
Reclamation District 1001  
Reclamation District 2103  
Sacramento Air Quality Management District  
Sacramento Area Council of Governments  
Sacramento Area Flood Control Agency  
Sacramento County Department of Environmental Review and Assessment  
Sacramento County Planning and Community Development Department  
Sacramento County Department of Water Resources  
Sacramento County Water Agency  
South Yuba Water District  
Sutter County Department of Public Works  
Sutter County Planning Department  
Yuba County Agricultural Department  
Yuba County Airport  
Yuba County Community Development Department  
Yuba County Department of Public Works  
Yuba County Office of Emergency Services  
Yuba County Water Agency  
Yuba-Sutter County Farm Bureau

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Friends of the River  
Hilcrest Water Company  
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Planning & Conservation League  
Plumas Lake Moms Group  
River Partners

Sacramento Central Library  
Sierra Club  
South Yuba River Citizens League  
Sutter County Library  
Water Forum  
Yuba County Library

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| Contaminant .....                                                                  | 3.4, 3.4.1.1, 3.4.2.2, 3.4.2.3, 3.4.2.4, 3.4.2.5, 3.4.3, 3.5.1.1, 3.5.2.2, 3.5.2.3, 3.5.2.5, 3.5.3, 3.8.2.2, 3.8.2.3, 3.8.2.4, 3.8.2.5, 3.8.3, 3.9.2.2, 3.9.2.3, 3.9.2.4, 3.9.2.5, 3.9.3, 3.11.1.2, 3.11.2.1, 4.1.2.11                                                                                                                                      |
| Corps flood protection projects .....                                              | 1.8.1, 2.2.2.2, 3.2.1.2, 3.3.1.1, 4.2.3.2                                                                                                                                                                                                                                                                                                                   |
| Cultural resources in the project area .....                                       | 3.10.1.2, 3.10.2.1                                                                                                                                                                                                                                                                                                                                          |
| Cultural resources survey .....                                                    | 3.10.1.2, 4.2.4.6, 5.1.1                                                                                                                                                                                                                                                                                                                                    |
| Degradation of existing levee .....                                                | 2.2.2.2                                                                                                                                                                                                                                                                                                                                                     |
| Development (projects, history) .....                                              | 4.1, 4.1.2.1, 4.1.2.2, 4.1.2.3, 4.1.2.4, 4.1.2.5, 4.1.2.6, 4.1.2.7, 4.1.2.8, 4.1.2.9, 4.1.2.10, 4.1.2.11, 4.2, 4.2.2, 4.2.3.1, 4.2.3.2, 4.2.3.3, 4.2.4.1, 4.2.4.2, 4.2.4.3, 4.2.4.5, 4.2.4.6, 4.2.4.7, 4.2.4.9, 4.2.4.12                                                                                                                                    |
| Economics/cost.....                                                                | ES.6, 2.1, 2.2.1, 2.2.2.2, 2.3, 3.1.2.1, 4.2.3.2, 5.1.3                                                                                                                                                                                                                                                                                                     |
| Elderberry shrub(s).....                                                           | ES.10.1, ES.13, 2.2.2.2, 3.7.1.1, 3.7.1.3, 3.7.2.2, 3.7.2.3, 3.7.2.4, 3.7.3, 3.9.1.2, 3.9.2.2, 3.9.2.3, 3.9.2.4, 3.9.3, 4.1.2.4, 4.2.4.1, 4.2.4.5                                                                                                                                                                                                           |
| Emergency levee repairs.....                                                       | 4.2.3.2                                                                                                                                                                                                                                                                                                                                                     |
| Endangered Species Act.....                                                        | 1.5.4, 1.9, 2.2.2.2, 3.8.1, 3.8.1.2, 3.8.2.1, 3.8.2.2, 3.8.3, 3.9.1, 3.9.1.2, 3.9.2.1, 3.9.2.2, 3.9.3, 4.2.4.4, 4.2.4.5, 5.1.4, 5.1.5, 5.1.6                                                                                                                                                                                                                |
| Environmental Site Assessment .....                                                | 3.5.1.1, 3.5.1.2, 3.5.2.2, 3.5.3, 4.1.2.11, 5.1.18                                                                                                                                                                                                                                                                                                          |
| Erosion.....                                                                       | 1.3, 1.7, 1.8.3.1, 1.8.3.2, 2.2.1, 2.2.2.2, 2.2.4.1, 2.2.4.2, 4.1.2.2, 4.1.2.3, 4.2.3.2, 4.2.4.2, 4.2.4.3, 4.2.4.7, 6.3                                                                                                                                                                                                                                     |
| Executive Order 11988, Floodplain Management.....                                  | 5.1.8                                                                                                                                                                                                                                                                                                                                                       |

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| Executive Order 11990, Protection of Wetlands .....                               | 5.1.10                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Executive Order 12898, Environmental Justice .....                                | 5.1.11                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Farmland Protection Policy Act .....                                              | 5.1.12                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Feather River Air Quality Management District .....                               | ES.13, 3.11.1.1, 3.11.1.2, 3.11.2.1, 4.1.2.7                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Feather River fisheries resources.....                                            | 3.8.1.1                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Federal Aviation Administration .....                                             | 5.1.19                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Federal general conformity thresholds .....                                       | ES.13, 3.11.2.1                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Fish and Wildlife Coordination Act .....                                          | 5.1.6                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Flood control .....                                                               | ES.1, ES.3.2, ES.4, ES.5, ES.6, ES.7, ES.9, ES.10, ES.11.3, 1.2, 1.5.3, 1.7, 1.8.1, 1.8.2<br>..... 1.9, 1.10, 2.0, 2.1, 2.2, 2.2.1, 2.2.2, 2.2.3, 2.2.4.2, 2.3, 3.1.1.2, 3.1.1.2, 3.1.2.2, 3.2.1.1, 3.2.2.1, 3.2.2.2, 3.3.1.1,<br>.. 3.3.2.2, 3.3.2.3, 3.3.1.1, 3.7.1.1, 3.10.1.1, 3.12.3, 3.14.2.2, 3.16.1, 4.1.2.1, 4.1.2.3, 4.2.1, 4.2.3.1, 4.2.3.2, 4.2.3.5,<br>..... 4.2.4, 4.2.4.1, 4.2.4.2, 4.2.4.3, 4.2.4.5, 4.2.4.7, 4.2.4.10, 4.3, 4.3.2.3, 5.1.8, 5.2.2 |
| Flood risk.....                                                                   | ES.2, ES.5, ES.8, 1.3, 1.8.3.13.3.2.3, 3.11.2.5, 3.16.2.5, 4.1, 4.1.2.1, 4.1.2.3,<br>..... 4.2.4.3, 4.3, 4.3.1, 4.3.2, 4.3.2.1, 4.3.2.2, 4.3.2.3, 4.3.3, 5.1.8, 5.2.8                                                                                                                                                                                                                                                                                              |
| Floodplain Drainage Swale – <i>see</i> setback area drainage swale                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Flood protection efforts .....                                                    | ES.6, 1.8, 1.8.1, 2.2.2.1, 4.1.2.1, 4.2.2, 4.2.4.3, 5.2.8                                                                                                                                                                                                                                                                                                                                                                                                          |
| Frequently Activated Floodplain .....                                             | 3.6.3                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| General construction plan.....                                                    | 2.2.4.2                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| General Re-Evaluation Report .....                                                | ES.6, ES.11.3, 1.5.3, 1.8.1, 2.2.1, 4.2.3.2                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Geomorphology .....                                                               | ES.10.1, ES.11.3, ES.13, 1.5.3, 2.3, 3.3, 3.3.1.4, 3.3.2.1, 3.3.2.4, 3.3.2.6, 3.3.3<br>..... 3.4.2.2, 3.14.2.2, 4.2.1, 4.2.4.2, 4.2.4.3                                                                                                                                                                                                                                                                                                                            |
| Geotechnical .....                                                                | ES.1, ES.5, ES.10.1, 1.1, 1.7, 1.8.3.1, 2.2.1, 2.2.2.1, 2.2.2.2, 2.2.4.2, 2.3, 3.2.1.1, 3.2.2.3,<br>..... 3.3.2.3, 3.5.1.1, 3.5.1.2, 4.2.4.3                                                                                                                                                                                                                                                                                                                       |
| Giant garter snake.....                                                           | ES.10.1, ES.13, 3.6.3, 3.7.1.3, 3.7.2.2, 3.7.2.3, 3.7.2.4, 3.7.2.5, 3.7.3, 3.9.1.2, 3.9.2.2,<br>..... 3.9.2.3, 3.9.2.4, 3.9.2.5, 3.9.3, 4.1. 2.4, 4.2.4.5, 5.1.4                                                                                                                                                                                                                                                                                                   |
| Gilsizer Slough South Giant Garter Snake Conservation Bank .....                  | 3.6.3, 3.7.2.2, 3.7.3, 3.9.2.2, 3.9.3                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Global climate change .....                                                       | 4.3, 4.3.1, 4.3.2, 4.3.3                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Ground failure/liquefaction .....                                                 | 3.2.1.1, 3.2.2.1, 3.2.3.2, 3.2.2.5                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Groundwater .....                                                                 | ES.11.3, ES.13, 1.5.3.2, 2.3, 3.2.1.1, 3.3, 3.3.1.2, 3.3.2.1, 3.3.2.3, 3.3.2.4, 3.3.2.5, 3.3.2.6,<br>..... 3.3.3, 3.4, 3.4.1.2, 3.4.2.2, 3.4.2.5, 3.5.1.1, 3.6.1.2, 3.14.2.1, 3.14.2.2, 4.1.2.3, 4.2.1, 4.2.4.3, 5.1.3                                                                                                                                                                                                                                             |
| Habitat enhancement .....                                                         | 3.8.3, 3.9.3                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Habitat types.....                                                                | 3.4.2.2, 3.6.1.1, 3.6.1.2, 3.6.2.2, 3.6.3, 3.7, 3.7.1.1, 3.9.1.1, 3.9.1.2                                                                                                                                                                                                                                                                                                                                                                                          |
| Historic Property Treatment Plan.....                                             | 3.10.3, 4.2.4.6                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Hydraulic benefits .....                                                          | 2.1.2.2, 2.2.2.2                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Hydraulic effects .....                                                           | ES.11.3, 1.5.3, 3.3.2.2                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Important Farmland .....                                                          | ES.10.1, ES.11.3, ES.13, 1.5.3, 2.3, 3.1.1.2, 3.1.2, 3.1.2.1, 3.1.2.2, 3.1.2.3,<br>..... 3.1.2.4, 3.1.3, 3.3.2.3, 3.3.2.4, 4.2.1                                                                                                                                                                                                                                                                                                                                   |
| Inundation Area (from 100-year flood event) .....                                 | ES.5, ES.13, 4.1.2.1, 4.2.4                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Jurisdictional habitat types .....                                                | 3.6.1.2                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Lake Oroville Surge Operations and Thermalito Afterbay Emergency Reoperation..... | 4.2.3.2                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Land ownership and jurisdiction .....                                             | 3.1.1.2                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Land use designations and zoning .....                                            | 3.1.1.2                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Levee conditions.....                                                             | 2.2.2.1, 3.2.1.2, 3.3.1.1                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Levee design flows .....                                                          | ES.3.3, 1.6.2                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Local air quality thresholds .....                                                | 3.11.2.1                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Local drainage .....                                                              | ES.10.1, 3.3.1.3, 3.3.2.3, 3.3.3, 3.4.2, 3.14.2.1, 4.2.4.3                                                                                                                                                                                                                                                                                                                                                                                                         |
| Local land uses .....                                                             | ES.13, 3.1.1.2, 3.1.2.2, 3.1.2.3, 4.2.4.1                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Local noise regulation .....                                                      | ES.10.1, ES.13, 3.12.2.1, 3.12.2.2, 3.12.2.3, 3.12.2.4, 3.12.2.5, 3.12.3                                                                                                                                                                                                                                                                                                                                                                                           |
| Marysville Ring Levee .....                                                       | ES.6, 1.8.1, 4.2.3.2                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Migratory Bird Treaty Act.....                                                    | ES.13, 3.7.2.2, 3.7.2.3, 3.7.2.4, 5.1.5                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Memorandum of Agreement (MOA) .....                                               | ES. 11.4, 1.5.4, 2.2.2.2, 3.10.3, 5.1.1                                                                                                                                                                                                                                                                                                                                                                                                                            |



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| Modesto Formation .....                                                                                  | ES.10.1, ES.10.2, 2.3, 3.10.3, 3.2.1.1, 3.2.2.4, 3.15.1.2,<br>3.15.2.3, 3.15.3.2, 3.15.3.3, 3.15.3.4, 4.2.4.11                                                                                                                                                                                                                                                                                                                                                |
| National Historic Preservation Act.....                                                                  | ES.11.4, 1.5.4, 2.2.2.2, 3.10.3, 4.2.4.6, 5.1.1                                                                                                                                                                                                                                                                                                                                                                                                               |
| Noise Control Act of 1972 .....                                                                          | 5.1.14                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Noise levels .....                                                                                       | ES.10.1, ES.13, 3.12.1.1, 3.12.1.2, 3.12.1.3, 3.12.2.1, 3.12.2.2, 3.12.2.3,<br>3.12.2.4, 3.12.2.5, 3.12.2.5, 3.12.3, 4.1.2.8, 4.2.4.8                                                                                                                                                                                                                                                                                                                         |
| Noise-sensitive receptors.....                                                                           | 3.12.1.1, 3.12.3                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Ordinary High Water Mark .....                                                                           | 2.2.1, 3.6.1.1, 3.6.2.4                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Pesticide.....                                                                                           | 3.4, 3.4.1.1, 3.4.2.2, 3.5, 3.5.1.1, 3.5.2.2, 3.5.3, 4.1.2.4, 4.2.4.5                                                                                                                                                                                                                                                                                                                                                                                         |
| Population and housing .....                                                                             | 3.0.2.1, 4.1.2.1                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Pump Station No. 3.....                                                                                  | ES.2, ES.3.1, ES.6, ES.10.1, ES.10.2, ES.10.3, ES.10.4, 1.3, 1.6.1, 1.7, 1.8.1, 2.2.1<br>2.2.2.2, 2.2.3, 2.2.4.2, 3.1.2.2, 3.1.2.3, 3.1.2.4, 3.2.1.1, 3.2.2.3, 3.3.1.3, 3.3.2.3, 3.4.2.2, 3.4.2.4, 3.6.2.2,<br>3.6.2.4, 3.7.1.1, 3.7.2.2, 3.7.2.3, 3.7.2.4, 3.8.2.2, 3.9.2.2, 3.9.2.3, 3.9.2.4, 3.11.2.3, 3.11.2.4, 3.12.2.2, 3.12.2.3,<br>3.12.2.4, 3.13.2.3, 3.14.1.2, 3.14.2.1, 3.14.2.2, 3.15.3.2, 3.15.3.4, 3.16.2.4, 4.2.3.2, 4.2.4.1, 4.2.4.7, 4.2.4.8 |
| Recognized environmental conditions.....                                                                 | 3.5.1.1, 3.5.1.2, 3.5.3                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Removing obstacles to growth .....                                                                       | 4.1.2, 4.2.2, 4.2.3.22, 4.2.4.1, 4.2.4.2, 4.2.4.3, 4.2.4.5                                                                                                                                                                                                                                                                                                                                                                                                    |
| Resource Conservation and Recovery Act (RCRA) .....                                                      | ES.6, ES.10.1, 1.8.1, 1.8.3.2, 2.1, 2.2.2.2,<br>3.13.2.2, 3.4.2.4, 3.5.1.2, 3.5.3, 5.1.18                                                                                                                                                                                                                                                                                                                                                                     |
| Ring levee.....                                                                                          | ES.6, ES.10.1, 1.8.1, 1.8.3.2, 2.1, 2.2.2.2, 3.13.2.2, 3.4.2.4, 4.2.3.2, 5.1.8                                                                                                                                                                                                                                                                                                                                                                                |
| Riverbank Formation.....                                                                                 | 3.2.1.1                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Sacramento River Flood Control System Evaluation Phase II Project (also System Evaluation Project) ..... | ES.6, ES.7, ES.8, 1.8.1, 1.8.2, 1.8.3.1, 4.1.2.1, 4.2.3.2, 4.2.4.2, 5.2.8                                                                                                                                                                                                                                                                                                                                                                                     |
| Section 7 – <i>see</i> Endangered Species Act                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Section 404 permit .....                                                                                 | ES.6, ES.10.4, ES.11, ES.12, ES.13, 1.5.4, 1.9, 3.6, 3.6.1.1, 3.6.2.1,<br>3.6.2.2, 3.6.3, 3.6.2.4, 3.6.2.3, 3.7.1.3, 4.1.2.4                                                                                                                                                                                                                                                                                                                                  |
| Section 408 permission.....                                                                              | ES.1, ES.6, ES.10.4, ES.11.4, ES.12, 1.1, 1.5.4, 1.9, 2.2.2.2, 2.3, 4.2.3.5, 5.1.3, 5.1.8                                                                                                                                                                                                                                                                                                                                                                     |
| Section 1602 permit – <i>see</i> Streambed Alteration Agreement                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Seepage berms .....                                                                                      | ES.6, ES.10.1, 1.8.1, 1.8.3.2, 2.2.4.2, 3.2.2.4, 3.2.2.5, 3.4.2.4, 4.2.3.2, 5.2.1                                                                                                                                                                                                                                                                                                                                                                             |
| Seismicity and fault zones .....                                                                         | 3.2.1.1                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Sensitive biological resources .....                                                                     | 3.7.1.3                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Setback area drainage swale.....                                                                         | 3.4.2.2, 3.6.2.2, 3.6.3,<br>3.8.2.2, 3.8.3, 3.9.2.2, 3.9.3, 3.12.2.2                                                                                                                                                                                                                                                                                                                                                                                          |
| Setback levee construction .....                                                                         | 2.2.2.2, 2.2.3, 3.3.2.4, 3.5.1.1, 3.5.2.2, 3.10.2, 3.10.2.2, 3.11.2.3,<br>3.13.2.2, 3.13.2.3, 3.14.2.2, 4.2.4.1, 4.2.4.7                                                                                                                                                                                                                                                                                                                                      |
| Short-term air quality impacts .....                                                                     | 3.11.3                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Site 7 .....                                                                                             | ES.6, 1.8.1, 2.2.2.2, 3.3.1.1                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Slurry cutoff wall.....                                                                                  | 2.2.2.2, 2.2.3, 2.2.4.2, 2.3, 3.2.2.4, 3.2.2.5, 3.4.2.4, 3.3.2.3, 3.3.2.4, 3.3.2.5, 3.5.2.4, 3.5.3,<br>3.11.2.3, 3.11.2.4, 3.12.2.3, 3.13.2.3, 3.13.2.4, 3.15.3.2, 4.2.3.2, 4.2.4.7                                                                                                                                                                                                                                                                           |
| Soil resources .....                                                                                     | 3.2.1.2                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Special-status fish species .....                                                                        | 3.8.1.2, 3.8.2.1, 3.8.2.2, 3.8.2.3, 3.8.2.4, 3.8.2.5, 3.8.3, 3.9.3, 3.9.1.3,<br>3.9.2.2, 3.9.2.3, 3.9.2.4,                                                                                                                                                                                                                                                                                                                                                    |
| Special-status plant species .....                                                                       | 3.7.1.3,, 3.9.1, 3.9.1.1, 3.9.2.1                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Special-status wildlife species .....                                                                    | ES.13, 3.7.1.3, 3.7.2.2, 3.7.2.3, 3.7.2.4, 3.9.1.2, 3.9.2.2, 3.9.2.3, 3.9.2.4,<br>3.9.2.5, 3.9.3                                                                                                                                                                                                                                                                                                                                                              |
| State Plan of Flood Protection.....                                                                      | 5.2.8                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| System Evaluation Project – <i>see</i> Sacramento River Flood Control System Evaluation Phase II Project |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Stage 1 construction .....                                                                               | ES.10.1, 2.2.2.2, 3.13.2.2                                                                                                                                                                                                                                                                                                                                                                                                                                    |
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| Staging areas and access routes .....                                                                    | 2.2.2.2, 2.2.4.2, 3.1.2.2, 3.1.3,<br>3.11.2.2, 3.12.2.5, 3.13.2.1, 3.2.2.3, 3.2.2.5                                                                                                                                                                                                                                                                                                                                                                           |
| State Lands Commission .....                                                                             | 5.2.7                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| State Mining and Geology Board .....                                                                     | 3.2.1.2, 5.2.5                                                                                                                                                                                                                                                                                                                                                                                                                                                |

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| Stormwater Pollution Prevention Plan (SWPPP) .....             | 3.2.2.3, 3.2.2.5, 3.2.2.6, 3.4.3, 3.8.3, 3.9.3, 4.1.2.3, 4.2.4.3, 4.2.4.4, 4.2.4.2                                                                                                                                                                                                                                               |
| Streambed Alteration Agreement .....                           | ES.13, 3.6.3, 3.8.3, 3.9.3, 4.2.4.3, 5.2.4                                                                                                                                                                                                                                                                                       |
| Subsidence and settlement.....                                 | 3.2.1.1                                                                                                                                                                                                                                                                                                                          |
| Sustainable Fisheries Act .....                                | 5.1.15, 5.1.16                                                                                                                                                                                                                                                                                                                   |
| Toxic air contaminants .....                                   | 3.11.2.1                                                                                                                                                                                                                                                                                                                         |
| Traffic .....                                                  | ES.10.1, ES.13, 2.2.2.2, 2.3, 3.11.3, 3.12.1.2, 3.12.1.3, 3.12.2.2, 3.13.2.4, 3.13.2.5, 3.13.3, 3.13, 3.13.1, 3.13.1.1, 3.13.1.2, 3.13.2.1, 3.13.2.2, 3.13.2.3, 3.14.2.4, 3.14.3                                                                                                                                                 |
| TRLIA's four-phase program of flood control improvements ..... | ES.10.1, 1.8.3, 4.2.3.2, 4.2.3.4                                                                                                                                                                                                                                                                                                 |
| Underseepage .....                                             | ES.2, ES.5, ES.6, Es.10.1, ES.10.3, ES.10.4, ES.11.3, 1.3, 1.53, 1.7.1, 1.8.3.2, 2.2.1, 2.2.2.1, 2.2.2.2, 2.2.4.1, 2.2.4.2, 2.3, 3.1.2.5, 3.2.2.4, 3.2.2.5, 3.2.2.6, 3.3.1.1, 3.3.2.3, 3.3.2.6, 3.4.2.5, 3.5.2.5, 3.7.2.5, 3.8.2.5, 3.9.2.5, 3.11.2.5, 3.13.2.5, 3.12.2.5, 3.14.2.5, 3.15.3.5, 3.16.2.5, 3.19.2.4, 4.2.3.2       |
| Utilities .....                                                | ES.10.1, ES.13, 2.2.2.2, 2.2.4.2, 3.1.3, 3.12.2.2, 3.13, 3.13.2.1, 3.14, 3.14.1.2, 3.14.2.1, 3.14.2.2, 3.14.2.3, 3.14.2.4, 3.14.2.5, 4.1, 4.1.2.1, 4.1.2.3, 4.1.2.10                                                                                                                                                             |
| Waste discharge requirements .....                             | ES.10.1, ES.13, 3.4.2.1, 3.4.2.2, 3.4.2.3, 3.4.2.4                                                                                                                                                                                                                                                                               |
| Water demand and available water supply .....                  | 3.3.2.3, 3.3.2.4, 4.1.2.3                                                                                                                                                                                                                                                                                                        |
| Water quality .....                                            | ES.6.1, ES.13, ES.10.1, 3.2.2.6, 3.4, 3.4.1.1, 3.4.1.2, 3.4.2.1, 3.4.2.2, 3.4.2.3, 3.4.2.4, 3.4.2.5, 3.4.3, 3.5, 3.5.2.2, 3.5.2.3, 3.5.3, 3.6, 3.6.3, 3.8.2.2, 3.8.2.3, 3.8.2.4, 3.8.2.5, 3.8.3, 3.9.2.2, 3.9.2.3, 3.9.2.4, 3.9.2.5, 3.9.3, 3.10.1.1, 3.11.3, 4.1.2.3, 4.1.2.10, 4.2.4.2, 4.2.4.3, 4.2.4.4, 5.1.3, 5.1.16, 5.2.3 |
| Waters of the U.S., including wetlands .....                   | ES.10.1, ES.10.3, ES.13, , 1.1, 1.9, 2.2.2.2, 2.3, 3.1.2.5, 3.6, 3.6.2.1, 3.4.1, 3.4.3, 3.6, 3.6.1, 3.6.2, 3.6.3, 3.7.1, 3.9, 4.1.2, 4.2.4, 5.1.3, 3.6.2.2, 3.6.2.5, 3.6, 3.7, 3.7.1.1, 3.7.1.3, 3.16.2.5, 5.1.3, 5.1.16, 5.2.3                                                                                                  |
| Western Pacific Interceptor Canal .....                        | ES.3.2, ES.4, ES.8, ES.10, 1.2.1, 1.8.1, 1.8.3.1, 1.8.3.2, 3.3.1.1                                                                                                                                                                                                                                                               |
| Yuba County General Plan .....                                 | 3.1.1.2, 3.1.2.2, 3.2.1.1, 3.2.1.2, 4.1.2.1, 4.1.2.2, 4.1.2.4, 4.1.2.5, 4.1.2.6, 4.1.2.7, 4.1.2.8, 4.1.2.9, 4.1.2.10, 4.1.2.11, 4.1.2.12, 4.2.4.5                                                                                                                                                                                |
| Yuba River Basin Investigation.....                            | 1.8.1, 1.10, 3.3.1.4, 4.2.3.2, 4.2.4.2                                                                                                                                                                                                                                                                                           |
| Yuba-Feather Supplemental Flood Control Project .....          | ES.7, 1.8.2, 1.10, 2.2, 3.2.1.1, 3.2.2.1, 3.3.1.1, 3.7.1.1                                                                                                                                                                                                                                                                       |